

日本—ASEAN科学技術協力
インドネシア高分子材料(特性解析)研究プロジェクト
巡回指導調査団報告書

平成4年4月

国際協力事業団
社会開発協力部

60. P

JICA LIBRARY



1098811(1)

23997

日本—ASEAN科学技術協力
インドネシア高分子材料(特性解析)研究プロジェクト
巡回指導調査団報告書

平成4年4月

国際協力事業団
社会開発協力部

国際協力事業団

23997

序 文

1983年5月のASEAN諸国歴訪の際、中曽根首相（当時）は、ASEAN諸国と科学技術を分かち合うという観点からの技術協力を提唱した。本構想に基づき、1983年11月から12月にかけて、東京で開催された高級事務レベル会合及び閣僚会議で協力内容が討議された。これを受けて、ASEAN科学技術委員会（COST）は、1984年3月にフィリピンで、1985年4月にはブルネイで会合し、バイオテクノロジー、マイクロエレクトロニクス、マテリアルサイエンスの3分野の協力を合意した。これらのうち、マテリアルサイエンス分野については、ASEAN側は、プロジェクト技術協力方式による我が国の協力を要請したため、1985年以降、ASEAN各国へ一連の調査団を派遣し、1987年11月までにASEAN各国とR/Dの署名を終了した。

ASEAN諸国のうちインドネシアにおいては、高分子材料研究に関し、一次構造解析・高次構造解析、物性評価、性能評価等の研究手法の技術移転を目的として、協力を実施している。

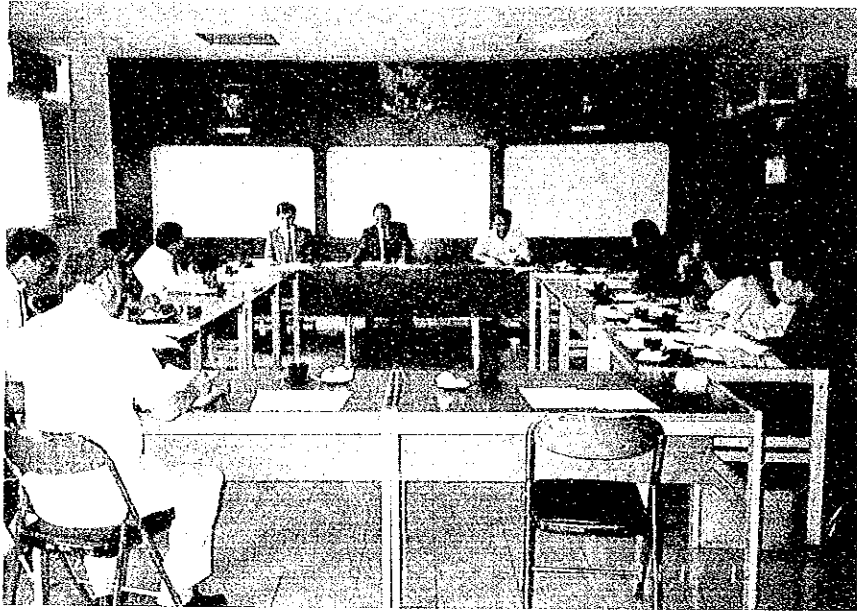
本巡回指導調査団は、本年9月末日の終了を目前に控えた現時点での問題点とその対応策、ならびに今後の協力内容をインドネシア側及び日本人専門家チームとの協議を行うことを目的として、1991年12月8日から1991年12月17日まで繊維高分子材料研究所素材合成部長浅井道彦氏を団長として派遣された。

この報告書は、本調査団の調査結果を取纏めたものである。

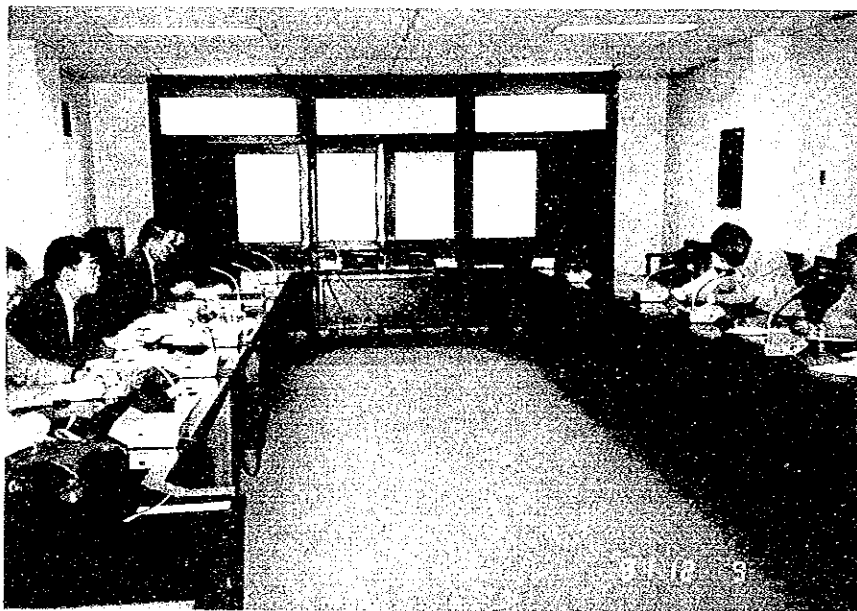
終わりに、本調査団の任にあたられた団員各位、及び本調査団派遣に際しご協力いただいた外務省、通商産業省ならびに内外関係機関の方々に対し、深甚の謝意を表する次第である。

平成4年4月

国際協力事業団
社会開発協力部
部長 中村 信



全体会議 (P3 FT、BBS、BBT、ITB、調査団)



LIPI長官表敬 (右から2人目が長官)

目 次

序 文

写 真

1. 巡回指導調査団派遣	1
1-1 派遣の経緯と目的	1
1-2 調査団の構成	2
1-3 調査日程表	3
1-4 主要面談者	4
2. 要 約	7
3. プロジェクト実施上の問題点	9
3-1 プロジェクトの進捗状況	9
3-2 問題と対策	10
3-3 供与資機材の利用状況	12
4. 指導内容	13
4-1 現地のとるべき対応策	13
4-2 日本側のとるべき対応策	15
5. インドネシア側との協議事項	17
5-1 経緯と概要	17
添付資料	21

1. 巡回指導調査団派遣

1-1 派遣の経緯と目的

本プロジェクトは、中曽根元総理の提案した日本・アセアン科学技術協力の、マテリアルサイエンス分野の協力6プロジェクトの一つとして、1987年10月1日から5年間の計画で実施されている。プロジェクトの協力内容は、アセアン諸国を対象にしたマルチラテラル事業と、インドネシアをホスト国としたバイラテラル事業からなる。日本側の協力機関は通商産業省工業技術院繊維高分子材料研究所が当たり、インドネシア側はインドネシア科学院(LIPI)の応用物理研究開発センター(P3FT)をフォーカルポイントとし、ほかに在バンドンのLIPI応用化学研究開発センター(P3KT)、工業省所轄のセルロース工業研究開発研究所(BBS)及び繊維工業研究開発研究所(BBT)、並びに教育文化省所轄のバンドン工科大学(ITB)の物理、化学、化学工学各学部が参加している。

これまで、本プロジェクトに関し、1988年12月に計画打合せ調査団、1989年11月に巡回指導調査団、1990年12月に計画打合せ(中間評価)調査団を順次派遣し、日本人専門家チーム及びインドネシア側プロジェクト関係者と本プロジェクトの実施、運営に関する協議、意見交換を行いつつプロジェクトの円滑かつ効率的な運営を図るべく努力してきた。今次調査団は、本年9月末日の終了を目前に控えた現時点での問題点とその対応策、並びに今後の協力内容をインドネシア側及び日本人専門家チームとの協議を行うことを目的に派遣された。具体的には、下記の事項について協議、調査を実施した。

- (1) 昨年度の中間評価で問題点として指摘した事項の改善状況を把握する。
 - ① フォーカルポイントのP3FTに集中配置されている機材向けのオペレーターが十分に確保されているか。
 - ② プロジェクト参加機関の研究者、特にITBの学生が機材を利用しやすい運営体制に改善されたか。
 - ③ プロジェクト参加機関のローカルコスト負担は改善されたか。
 - ④ プロジェクト参加機関相互の連携は改善されたか。
- (2) 上記の点において改善が不十分と認められる場合は、機材の各参加機関への分散配置、機材利用規程の改善、要員増強数等の具体的な改善策をインドネシア側に提示する。
- (3) 工業省、国家開発企画庁(BAPPENAS)、ITS本部等の責任者と参加機関のローカルコスト負担等につき意見を交換する。
- (4) 参加機関の代表者とプロジェクトの運営全体につき意見を交換する。
- (5) 以上の結果を踏まえ、今後のプロジェクトの実施計画並びに日本側投入計画について

協議する。

(6) プロジェクト終了後の計画をインドネシア側から聴取する。

(7) 日本及びインドネシア双方のリーダーに最近意志の疎通欠如が伝えられることから、双方から意見を聴取し、改善策を探る。

1-2 調査団の構成

- | | | |
|------------------|---------|---------------------------------|
| (1) 浅井道彦
(団長) | 総 括 | 工業技術院繊維高分子材料研究所
素材合成部長 |
| (2) 清水 隆
(団員) | 高分子材料研究 | 工業技術院繊維高分子材料研究所
生体工学部主任研究官 |
| (3) 成田明敏
(団員) | 協力企画 | 国際協力事業団社会開発協力部
社会開発協力第一課課長代理 |

1-3 調査日程表

日順	月 日	曜	行 程	調 査 内 容
1	12月8日	日	成田 →ジャカルタ	移動 (GA873便)
			ジャカルタ	(夕) 日本側打合せ
2	9日	月	ジャカルタ	(午前) インドネシア科学院長官表敬 JICA事務所表敬 (午後) 日本側打合せ
3	10日	火	ジャカルタ →バンドン	(午前) 工業省訪問 (午後) 移動 (車輛) 事前協議 (物理研) (夕) 調査団主催夕食会
4	11日	水	バンドン	(午前) 事前協議 (物理研) (午後) バンドン工科大学本部訪問 事前協議 (物理研)
5	12日	木	バンドン	(午前) 繊維研訪問 (工業省機関協議) アルジョノ所長主催昼食会 (午後) 事前協議 (物理研) ミニッツ案作成
6	13日	金	バンドン	(午前) 全体会議 (物理研) (夕) ミニッツ署名 調査団長主催晩餐会
7	14日	土	バンドン →ジャカルタ	(午前) 移動 (車輛) 国家開発企画庁訪問
8	15日	日	ジャカルタ	資料整理
9	16日	月	ジャカルタ	(午前) JICA事務所報告 インドネシア科学院報告・イン ドネシア側リーダー懇談 (午後) 日本大使館報告
			ジャカルタ→	(夜) 移動 (GA872便)
10	17日	火	成田	(早朝) 成田着

1-4 主要面談者

- (1) インドネシア科学院(LIPI; Lembaga Ilmu Pengetahuan Indonesia)
- ・ Prof. Samaun Samadikun 長官
 - ・ Prof. Didin S.Sastrapradja 副長官
 - ・ Ms. Moertini Atmowidjojo 国際協力部長
- (2) 工業省(Ministry of Industry)
- ・ Ms. Ainsjah Taufik 海外協力局長
- (3) 国家開発企画庁(BAPPENAS)
- ・ Dr. Triono Soendoro 社会・科学局長
- (4) 応用物理研究開発センター(P 3 FT ; R&D Centre for Applied Physics)
- Mr. Arjuno Brojonegoro 所長
 - ・ Dr. Niryardi Kahar 材料科学部長
 - Mr. Tun A.Saanin 科学技術サービス部長
 - Dr. Wiwik S.Subowo 木材エラストマー室長
- (5) バンドン工科大学(ITB ; Bandung Institute of Technolog)
- ・ Prof. Wiranto Arismunandar 学長
 - ・ Prof. Arifin Wardiman 副学長
 - Prof. Tjia May On 物理学科教授
 - Prof. N. M. Surdia 化学科教授
 - ・ Dr. Cyntia Radiman 化学科講師
- (6) 繊維工業研究開発研究所(BBT; Institute for R&D of Textile Industries)
- Mr. Rasyid Djufri 繊維化学部長
 - ・ Ms. Purwati Kusno 技術開発部長
 - Mr. Zubaidi
 - ・ Mr. Widayat
- (7) セルロース工業研究開発研究所(BBS; Institute for R&D of Cellulose Industries)
- ・ Ms. Hendayani Teguh Adisesha セルロース誘導体・公害部
 - Ms. Nursjamus Bahar Tobing
 - Mr. Tri Priadi Baski

(8) 日本大使館

・大村哲臣

二等書記官

(9) JICAインドネシア事務所

・金子節志

次長

○種田昇

所員

(10) 日本側専門家チーム

○井口正俊

長期専門家（リーダー）

○賀代純三

”（高分子材料研究）

○牧野千秋

”（調整員）

注) ○印は全体会議出席者

2. 要約

2-1 プロジェクトの管理運営について

プロジェクト開始に当たり、供与機材の配置につきインドネシア側のフォーカルポイントであるP3FTが機材の維持管理に責任をもち、他の参加研究機関の機材利用のための便宜を図ることを付帯条件として、P3FTへの集中配置を決定した。しかし、P3FTにおける研究員、オペレーターの大規模な増員はなく、しかもこの1年間では逆に減少しており、本年度を含め供与した30機種以上の機材の維持管理は困難との判断から、インドネシア側に、①機材の分散配置、②プロジェクト向け要員の確保、③参加機関特に学生が機材を使用しやすい利用規程の見直し—を要請し協議した結果、次の点で合意した。

- (1) 1991年度供与機材から各参加機関に分散配置し、各機関は維持管理と他機関の利用便宜につきプロジェクト終了後も責任をもち。
- (2) P3FTは1992年から毎年4人以上のプロジェクト向け要員の採用を、十分な要員を確保できるまで継続する。
- (3) 修士課程及び博士課程の大学院生は供与機材を使用できるものとする。

なお、インドネシア側のローカルコストはLIPIの参加機関は約7億ルピア(約4,7千万円)の予算を確保しているが、他省庁の機関は皆無に等しく、この点を工業省及びバンドン工大の責任者にただしたところ、今後配置する機材の維持管理に責任をもつとの言質を得た。また、インドネシア側と日本チームとの協力関係に円滑さを欠いている現状を打開するため、双方が出席してプロジェクトの運営上の問題点を協議する毎週の定例会議を再開すること、及びインドネシア側に専従の事務局を1992年当初から置くことに合意した。

2-2 今後の活動計画について

(1) 短期専門家派遣

1991年度：広津敏博(織高研)「表面改質高分子膜」1992年2月(1ヶ月)

1992年度：研究員 4名

機材据付 4名

(2) 研修生受入れ

1991年度：ヘンダヤニ部長(BBS)「セルロース誘導体の特性解析」1992年3月-4月 1ヶ月

1992年度：インドネシア 2名

アセアン他国 1名

(3) 1992年度機材供与：予算、納期により選択

凍結乾燥機、曲げ疲労試験機、衝撃試験機、破裂試験機、静電気測定器、
四端子電導計、真空蒸着装置、膜厚計

(4) マルチラテラル活動

トレーニング：1992年6月 4週間

セミナー：1992年7月 2 - 3日間

第3回アセアン科学技術週間：1992年9月（於シンガポール） 短期専門家派遣

3. プロジェクト実施上の諸問題

3-1 プロジェクトの進捗状況

プロジェクトは現在日本人長期専門家3名（リーダー、高分子材料研究専門家、コーディネーター）を現地に常駐させるとともに、これまで短期専門家24名（研究指導10名、機材据付け14名）を派遣し、研修生14名（インドネシア13名、フィリピン1名）を日本側に受け入れてきた。また、本年度を含め32機種（約3億円）の機材と相当数の携行機材（約3千万円）が投入されてきた。

プロジェクト発足当時要望が強かった、参加機関が既存する故障した装置の補修は、携行機材でスペアパーツを補充できる範囲で修理に対応でき、その後良好に活用されている。また、P3FTに集中配置されている大型機材は、高分子材料特性解析に必要な基本機器の8割程度充足される状況であるが、その習熟度については一部を除き未だしの感が否めない。

一方、本プロジェクトを推進する上での特徴として、インドネシア側の参加機関が特定のリサーチトピックス（後に「サブプロジェクト」と呼称）を設定して、供与機材の高分子材料解析技術を駆使しながら研究展開を図ることにより、全体として高分子材料技術の基盤向上に資することを目的としてきた。プロジェクト発足当初に設定した「膜」「合成繊維」「木材パルプ化」「CMC」「ブレンド」「高分子物性」のテーマの中には、日本での研修等プロジェクトの進捗の影響を大きく受け、「中空糸」「染色性」「ゴム廃材のCM化」「導電高分子」等の当初は予想できなかったテーマ展開が図られ、特許出願等の具体的な成果が見られることは特記すべきである。

この1年間に実施されてきた各機関のサブプロジェクトの進捗状況は資料4のように報告されている。各機関のサブプロジェクトは次のとおりである。

(1) P3FT

「CMゴム材の調製と特性解析」

「CMゴム材の接着への利用」

「ゴム製品の特性解析」

「ポリオレフィンの耐候試験による分解」

「ポリエステル/ナイロンのブレンド」

「射出成形における高分子のレオロジー特性」

(2) ITB-物理

「導電性高分子」

(3) ITB-化学

「合成高分子の高次構造と分解」

「ポリブレンドの界面現象」

「高分子分離膜」

(4) BBS

「Pinus merkusiiの前加水分解硫酸パルプ法における高分子の特性解析」

(5) BBT

「改質ポリエステル、ビスコースレーヨン及び樹脂加工の特性解析」

また、1989年3月から定期的で開催されている「インドネシア-JICA高分子シンポジウム」と1991年3月に設立された「バンドンポリマーグループ」も本プロジェクトの成果であり、従来連携のなかったインドネシアの高分子研究者の活動に今後大きく資すると考えられる。

さらに、マルチラテラル事業はトレーニング、共同研究、シンポジウムの開催に加え、シンガポール、タイから上級研究者を招聘してセミナーを開催するなど活発である。

3-2 問題と対策

(1) プロジェクトの運営体制

本プロジェクトのフォーカルポイントであるP3FT以外の積極的参加を図るため、全参加機関の代表者からなるマネージメント・ミーティングの開催頻度を従来の年2回から隔月に昨年より改めその効果がでてきているものの、日本人専門家チームとフォーカルポイントとの意見交換の場となる毎週金曜日に定例化されていたレギュラー・ミーティングが最近全く開催されていないことは、プロジェクトの円滑な運営に支障をきたしているが、早期の再開が急務である。また、インドネシア側に全体を把握している事務局がないことが日本人専門家、特にコーディネーターの負担を大きくしているのみならず、各種事務の停滞の原因となっていることから、専従の事務局の設置が必要である。

(2) 両国リーダーの意思疎通

昨年4月にインドネシア側リーダーが交替(Dr.Arjuno→Dr.Niryardi)してから、両国リーダーの意思疎通に欠けることが特に最近多く、上記レギュラー・ミーティングが開催できないことの遠因にもなっている。インドネシア側は、日本側新リーダーがインドネシア側リーダーを介せずに直接参加機関と接触することは内政干渉に当たるとの感を抱き、一方日本側はインドネシア側リーダーが、①事務上の処理が遅いから日本側がやる、②重要会議（例えばマニラにおけるプロジェクト責任者会議、スラバヤでの化学工学会議）に出席しない、③「バンドンポリマーグループ」設立の際JICAチームの活動を妨害した、④A2-3フォーム送付の事務手続を怠った、⑤会議で決定したこと

を実行しないなどリーダーの役割を果たしていないとしている。一方で両国リーダーの不和は、両者の強い個性が衝突した結果とも考えられ、早期の関係修復が望まれる。

(3) P 3 FTのマンパワー (資料5参照)

P 3 FTの研究員及びオペレーター的人数は1988年5名、1989年12名、1990年18名と増加してきたが、1991年には17名と減少している。インドネシアにおける公務員の給与体系にも起因しようが、昨年度の中間評価で指摘した増員が実現していないため、このまま推移すれば現在P 3 FTに設置されている23機種機材の維持管理が不可能になることは必至であり、早急に増員を図るべきであり、増員が困難である場合には機材の分散配置を図るべきである。

(4) インドネシア側ローカルコスト負担 (資料5参照)

LIPIのP 3 FT、P 3 KTには当初からプロジェクト向けの予算が計上されているが、他の参加機関のローカルコスト負担は皆無に等しい。P 3 FTは、1988年25百万Rp、1989年75百万Rp、1990年220百万Rp、1991年319百万Rpの予算を確保しており、この用途がこれまで不明であったが今回初めて1990、1991両年度の内訳は開示してきた。その中で特記すべきはオノラリア (付加給与) にそれぞれ17百万Rp、20百万Rp充当していることである。また備品にも115百万Rp、200百万Rp充当しており、今回詳細は確認できなかったが用途さえ合目的であればプロジェクト向けの研究予算としては充分と考えられる。しかし、他省庁の参加機関については、所属する上級官庁やBAPPENASの認知がプロジェクト発足当初に得られていないため現時点での大幅な改善は望めない。

(5) 供与機材利用規程 (資料5参照)

昨年度の中間評価でP 3 FT以外の参加機関から、供与機材が利用しにくいとの意見が出されていたため、その改善を求めたが、現在学生については指導教官1名当たり学生1名が1学期に1回と制約されていたが、他の制約条件はない模様であり、ITBの学生が利用しやすい運用規程に改めるべきである。さらに、プロジェクト参加機関以外の外部機関に対しては優先順位を落として利用させる規程となっており、この場合は有料化が原則となっているとしている。日本側リーダーは外部開放に反対との意を表しているが、本来のプロジェクト業務に支障がないかぎりの外部開放はプロジェクト終了後の機材有効利用のためにも徐々に進めるべきと考えられる。

(6) 研究基盤整備

プロジェクトに参加している各機関の研究成果の発表状況は、全体的にみてプロジェクト開始以前の5年間と比べれば格段に件数が増加しており、プロジェクトの目的を果たしつつあるものと評価される。しかし、国際的に権威ある学術雑誌、研究集会への発表にはそのレベルが至っていない。その主な原因は次のような研究活動のインフラが未

整備に起因するところが大きい。

- ① 研究リーダーの絶対数が不足している。
- ② 基礎研究に必要な予算が極めて限定されている。
- ③ 予算不足のため学術雑誌が入手できない。
- ④ 研究者の交流の機会が限定されている。
- ⑤ 研究集会が身近なところで開催される機会が少ない。

本プロジェクトは②④⑤の改善に少なからず寄与しているが、③のような部分にも予算運用で寄与できる可能性をもっている。

3-3 供与資機材の利用状況（資料7参照）

これまでに供与された23機種の機材はフォーカルポイントであるP3FTに集中配置されている。利用頻度が高いのは走査型電子顕微鏡、引張試験機、押出試験機、GPC、X線回折、FTIRである。また、P3FT以外の参加機関が利用しているのは走査型電子顕微鏡、熱分析、X線回折、引張試験機、押出試験機であり、逆にトレーニング以外でP3FTのみが利用しているのは、耐候性試験機、クリープ試験機、射出成形機、フロー試験機、FTIR、木材含浸装置である。

P3FTの機材利用規程では、ITBの学生以外には参加機関がプロジェクト上のテーマに基づく測定には特に制限が設けられていないことから、他の参加機関の利用頻度は少ないと考えられるが、他の参加機関が利用しようとしても、P3FTの機材に対する習熟度が低いことが障害になっているとの他機関の指摘もある。P3FTに設置した機材が有効利用されるには、機材の操作法の習熟もさることながら、P3FT自身が確固たる目標をもった研究テーマを設定することが重要である。

また、プロジェクト参加機関以外には、原子力研究所（バタン）、UNIR（スラバヤ）、ボゴール栽培研究所など公的機関のほか、ポリゴン社、B4T、UNPADのような企業も利用しているが、こうしたプロジェクト参加機関以外からの利用に対しては有料化しているという。

4. 指導内容

4-1 現地のとるべき対応策

インドネシア側は今後の改善策として資料6を提出、これに基づいて協議の結果、以下の点で今後の対応策として合意が得られた。

(1) プロジェクト実施体制

両国リーダーの不和から、毎週金曜日の午前中に定例化されていたレギュラー・ミーティングが2、3ヶ月前から開かれていないが、フォーカルポイントと日本側の唯一の公式的な意見交換の場である本ミーティングは、プロジェクトの円滑な推進のために不可欠である。本ミーティングが開催されていないことは、日本側の一方的な事務処理や、他参加機関との直接接触による諸事の決定などに見做されうることなど、両国リーダーの関係をますます悪化させる一因となっているとも考えられることから、早急に再開されることになり、実際本年1月3日から再開された。

また、これまでインドネシア側に専従の事務局が存在しないために、事務的な停滞等の障害を余儀なくされ、止むを得ず日本側が事務処理をすることになってきた経緯があるが、1992年当初から専従の秘書を事務局として置くことになり、この点を改善することになった。これは、現在実現され、秘書専門学校出身の女性が日本人専門家チームと同室に駐在することになった。従来資機材の現地購入の事務手続きや、マルチラテラル事業を実施する際の通信事務がインドネシア側の協力下で行われることになる。

(2) 供与機材の分散配置

プロジェクト発足以前から、インドネシア側はジャカルタ郊外セルボンのP3FT本部に一括配置するとしたが、日本側がバンドンのP3FTに設置すべきとの主張により、現在のバンドンP3FTへの配置となっている。この際、P3FTは機材の維持管理に責任をもつとともに、プロジェクトに参加するP3FT以外の機関の利用に便宜を図ることが付帯条件とされた。しかし、プロジェクト発足以来P3FTのプロジェクト参加要員が大幅に増員されていない状況から、このまま推移すれば機材の維持管理に危惧がもたれることから、今次調査団で現地の要員強化の対応振りを確認した上で、機材の有効利用を図るためにも、機材の他機関への分散配置をインドネシア側に提案した。LIPI長官は分散配置に反対とのことであったが、協議の結果、すでに設置した機材については備品管理の問題もあり分散配置は困難とされるが、これまで供与した機材をバンドンのP3FTに設置を継続するとともに、1991年度の供与機材から分散配置することになった。従って、1991年度供与機材は次のように配置されることになった。

NMR : P 3 FT

逆浸透/限外濾過装置 : ITB

光散乱装置 : ITB

中空糸紡糸装置 : ITB

蒸気圧浸透圧計 : ITB

パルプ変色試験機 : BBS

ガスクロマトグラフ : P 3 FT

光沢計 : BBT

繰返し振動疲労試験機 : P 3 FT

これらの機材を設置する機関は、プロジェクト実施中のみならずプロジェクト終了後も、機材の維持管理に責任をもつとともに、他の参加機関の利用に対し便宜を図ることになる。ただし、測定に必要な消耗品は利用者負担となる。また、分散配置になるため、インドネシア陸揚げ後の事務処理及び諸費用分担を各機関が協議して責任をもつこととする。しかし、機材の所属や維持管理のチェック体制については未検討のまま残された。

(3) プロジェクト要員の確保

すでにP 3 FTに設置されている供与機材の維持管理を充分に行う場合には少なくとも30名の要員が必要との観点から、具体的な要員増強を要求した。昨年度は他のLIPI研究機関で新人採用の必要があったため、そのほかの研究機関での新規採用は認められなかったものの、来年度から可能とし、P 3 FTは来年度から毎年4名以上の新人を採用する予算を確保することになった。この際別途P 3 FT内部の配置換え等でも対応に努力することになった。1992年当初早くも1名の研究員がP 3 FTを退職することとなったが、同時に1名の増員があったため、現在17名。

(4) 供与機材利用規程見直し

これまで供与機材をITBの学生が利用するには、指導教官当たり学生1名が1学期に1回という、極めて制約された条件があったが、今後修士過程及び博士過程の大学院生については、教授の責任のもとに自由に利用できることになった。

(5) 今後の研究計画

プロジェクト終了を目前に控えた現在、プロジェクトの終了後の対策を講ずるため、インドネシア側の研究計画を調査することとし、日本側リーダーが調査表を作成の上、各参加機関の計画を速やかに調査することになった。

4-2 日本側のとるべき対応策

(1) 専門家派遣

長期専門家は現在の3名の体制を継続する。

短期専門家については、

1991年度：広津敏博（織高研）「表面改質高分子膜」1992年2月 1ヶ月

1992年度：研究員4名「NMR」「FTIR」「分子量」「高分子合成」（長谷川正木東大教授）

機材据付4名「NMR」「GC」「光散乱」「浸透圧計」

なお、「走査型電子顕微鏡」の研究員派遣依頼があったが、内容が単なる装置操作法であることから、ジャカルタからの技術者派遣で対応することとした。

(2) 研修生受入れ

1991年度：ヘンダヤニ部長（セルロース研）

「セルロース誘導体の特性解析」1992年3月 1ヶ月

1992年度：ティア教授（バンドン工大物理）1ヶ月

ラディマン講師（バンドン工大化学）5ヶ月

アセアン他国1名

なお、アセアンからの候補者以外に、織高研にきているアセアン諸国からの研修希望者からも選択できるものとし、この時はアルジョノ所長に当該国から推薦する。

アセアン側候補者：

マレーシア：Mr. Mustafah Jamaludin(SIRIM)

フィリピン：Ms. Gloria U.Gopez(ITDI)

タイ：Mr. Payab Namprasert（科学サービス省）

(3) 供与機材

1991年度：分散配置になるため、輸送に当たって梱包に注意する。

1992年度機材供与：予算、納期により下記から選択する。

凍結乾燥機、耐揉疲労試験機、衝撃試験機、破裂試験機、静電気測定器、

四端子電導計、真空蒸着装置、膜厚計

なお、このほかにフィルムブロー成形機、研磨装置の要請があったが、協議の結果見送ることとした。

(4) マルチラテラル活動

トレーニング：1992年6月 4週間

セミナー：1992年7月 2 - 3日間

なお、上記活動は、両活動を一体化して事務手続を簡略化し、かつインドネシア側が準備作業を支援する。

第3回アセアン科学技術週間：1992年9月（於シンガポール）

プロジェクトチームから派遣、及び日本から短期専門家派遣

(5) その他

上記4-1(1)に述べたように、プロジェクト現場でのレギュラー・ミーティングの再開が両国チームの関係改善には急務である。そこで、JICA事務所は毎週のミーティングのアジェンダ及び議事録の提出を求めることとした。

5. インドネシア側との協議事項

5-1 経緯と概要

(1) LIPI長官表敬(12月9日)

アルジョノ所長が同席したこの訪問では、資料1のLIPI長官宛団長書簡案に基づき、口頭で今次調査団の目的と問題意識を説明し、P3FTのプロジェクト要員が増強されない場合は供与機材の他機関への分散配置を検討する必要があること、及びこのまま推移すれば今後の機材供与は困難になる可能性があることを示唆した。また、資料8の各参加機関のプロジェクトに対する自己評価表(日本側コーディネーターが「Project Cycle Management」手法で評価。JICA事務所と協議の上11月18日に各機関に発出)を手渡し、両国リーダーの意志疎通に欠ける現状を伝えるとともに、P3FTがフォーカルポイントとしての役割を充分果たしていないとの日本人専門家チームの認識を伝えた。

長官からは「科学的な研究協力を行いたい、両国の科学者の力量に差がある」「予算確保に努力するが、要員確保は公務員の給与の問題があって極めて困難であり、他機関も同様」等の発言があった。

(2) P3FTとの事前協議(12月10日、12日)

インドネシア側リーダーであるカハール部長はネパールに出張中で不在。アルジョノ所長、トゥン部長、スポヴォ室長と延べ4回協議。前半2回は日本側は調査団のみ出席。

① プロジェクト運営上の改善案

インドネシア側は、資料6(このペーパーはLIPI長官表敬後作成された模様)に基づき、外部機関特にITBの学生への開放策、機材操作習熟度の向上、プロジェクト終了後も機材の維持管理の予算を確保、LIPIはプロジェクト要員の増強予算を今後確保、両国チームの定期的協議を開催、しかしLIPIは機材の集中配置を要望、一などの改善案に提示し、特に機材の分散配置について協議。

② 今後の協力計画

短期専門家派遣、研修生受入れ、供与機材、マルチラテラル事業につき協議したが、これらにつき事前に両国チームで打合せした形跡がなく、双方の意見を聴取しつつ調整。特に供与機材の機種とマルチラテラル事業の開催を巡って両国に隔たり大きく調整難航。協議の結果、機材は順位をつけず、またマテリアルのトレーニングをプロジェクト終了目前に実施することに日本チームが反対したが、シンポジウム/トレーニングの一体的な開催とインドネシア側の準備支援で合意。

③ その他

3ヶ月前にLIPIはP3FTがマテリアルサイエンスのナショナル・フォーカルポイントとなることを決定し、プロポーザルをBAPPENASに提出する予定。分野は高分子、セラミックス、金属、マイクロエレクトロニクス。高分子ではセルロース誘導体、ゴム、ポリマー・ブレンド、機能性ポリマー。

プロジェクト終了後の計画については、インドネシア側は当初建物の建設を含む膨大な計画を提出したが、調査団から機材は高分子研究に十分な機種を供与したが、これに対し日本側は、今後はこれら機材を有効に利用して研究を実施することが重要と説明。最終的には、人的交流を主体とするフォロー・アップを要望。プロジェクト終了後の研究計画を各機関から早急に提出すべく調査団から要請した。

(3) 全体会議 (12月13日)

インドネシア側及び調査団からプロジェクトの進捗状況(資料2、資料3)を報告した後、事前協議を踏まえたミニッツ案を提示し、協議の上了承される。

(4) 工業省表敬 (12月10日)

機材の一部が今後工業省所轄のBBSとBBTに配置された場合の維持管理と、本プロジェクトへのローカルコスト負担状況を質疑した。

海外協力局長からは「本プロジェクトの窓口はLIPIであり、工業省を含めた合意が必要であるが、大きな予算でなければ大丈夫、研究開発局長が相談相手となる」との発言があった。

(5) ITB本部訪問 (12月11日)

1991年度からの供与機材のうち一部の機材はITBの設置される可能性が高いこと、ITBの大学院生が機材を利用しやすい運用規程に改善される見込みを説明。副学長から「歓迎する。機材の維持管理、スペアパーツの予算は学長に相談する」との発言があった。なお、機材の設置場所を早急に検討することになった。

(6) BBT訪問 (12月12日)

BBS及びBBTの関係者と協議。1991年度からの供与機材のうち一部の機材が両機関に配置されることを説明し、陸揚げ後の諸費用の分担、維持管理と外部への開放に責任をもつことを説明。自己評価表に基づき協議。「両国チームから別々に仕事がある」「P3FTの装置をもっと利用したいが、忙しすぎて教えてくれる余裕がないし、機材を使いこなせる人が少ない、もっとよく装置をマスターして欲しい」「合成繊維の紡糸装置が必要」「マルチはうまくいっている。フィリピンと天然繊維の共同研究をしたい」等の発言あり。

(7) BAPPENAS表敬 (12月14日)

資料に沿って、調査の目的、問題点を説明した後、ミニッツを概略説明し、プロジェクトへのサポートを要請。社会・科学局長からは「インドネシアにも良い科学者はお
り、インフラ整備を進めたい」「目的の明確な研究を支援するため、装置等を主眼とし
ない質の高いプロジェクトのプロポーザルを受け付けている」「プロポーザルのレ
ビューが終わるまで予算を凍結している」「アルジョノ所長、LIPI長官とも話してい
る。BAPPENASの長官と緊密に相談してやっている」等の意見開陳があった。

(8) LIPI本部報告 (12月16日)

長官はヨルダン訪問で不在、副長官に報告。「大変うまく行って嬉しい」「インドネ
シアでは一つのことに集中するのが困難。日本側との間に、不協和なことや不都合なこ
とがあれば謝りたい」「残りの有益な進捗のためにも、一歩ずつ進みたい」等の発言が
あった。

一方、ネパールから帰国したカハールリーダーと、副長官会見の前後に調査団及び
JICA事務所のみにて懇談。井口リーダーとの関係につき「両国の文化・システム等の
相違から考え方・視点に食い違いが生じ、コミュニケーションがうまくいっていなかつ
た」との発言があった。

それに対し、調査団から「両国リーダー間の良好な関係はプロジェクトの円滑な実施
に必要不可欠である」とコメントし、カハールリーダーの同意を得た。また、アルジョ
ノ所長から「レギュラー・ミーティングを今後速やかに再開するつもりだ」との補足発
言があった。

添 付 資 料

1. LIPI長官宛団長書簡（案）	23
2. 調査団作成進捗状況報告書	31
3. プロジェクト側作成進捗状況報告書	41
4. サブプロジェクト進捗状況報告書	55
5. プロジェクト側作成調査書	81
6. プロジェクト側作成改善案	89
7. プロジェクト側作成機材利用状況	93
8. 参加機関自己評価表	111
9. 日本人専門家チーム作成進捗状況報告書	133
10. P3FT配置図	159
11. ミニッツ	163

1. LIPI長官宛団長書簡（案）

Dr. Samaun Samadikun
Chairman, Indonesia Institute of Sciences
Jl. Jendr. Gatot Subroto 10
Jakarta 12710

Dear Dr. Samaun Samadikun :

I have been very much respectful that you have been deeply understanding and having a great leadership on the promotion of the Project on characterization of polymeric materials under Japan-ASEAN Cooperation on Materials Science and Technology being carried out by the Japanese government through Japanese International Cooperation Agency (JICA).

The cooperation Project, started on 1st October 1987 and planned for five years, has mostly been carried out smoothly in general. With less than a year remaining for the Project, it is now time to discuss how to successfully close the Project.

Japan and Indonesia agreed on the following points after a series of discussions prior to the start of the Project (ANNEX I).

- 1) The objective of the project is to strengthen the technological basis for the characterization of polymeric materials in ASEAN, particularly in Indonesia.
- 2) The following three are scope of work; i) molecular structure, ii) super molecular structure, iii) physical properties/performance.
- 3) While National Institute of Physics (LFN; currently Research and Development Centre for Applied Physics (P3FT)), LIPI, is to be the focal point, research teams should be set up with researchers from the following institutions in Bandung;
Research and Development Centre for Applied Physics (P3FT), LIPI;
Research and Development Centre for Applied Chemistry (P3KT), LIPI;
Bandung Institute of Technology (physics, chemistry, chemical engineering),
Ministry of Education and Culture (MEC);
Institute for Research and Development of Textile Industry (IRDTI),
Department of Industry (DOI);
Institute for Research and Development of Cellulose Industry (IRDICI), DOI.
- 4) All the necessary equipment provided by JICA is located in P3FT laboratory as the focal point. The Indonesian leader is responsible on the management of those equipments in terms of necessary maintenance as well as the arrangement to facilitate the research groups to use the facilities for their research programs.
- 5) The Indonesian institutions participating this project will form research teams which will focus on specific research topics (currently "sub-projects") which are to be carried out by utilizing donated equipments.

In order for smooth and effective promotion of the Project, it is necessary to note on the following two points with special attention.

1) P3FT is responsible for necessary maintenance of those equipments and for arrangement to facilitate the research groups from other participating institutions to use the facilities.

2) The organizations participating allocate budget for local cost for carrying out sub-projects.

On the other hand, Japanese Technical Guidance Team (Mid-term Evaluation) in December, 1990, pointed out that the following efforts were to be made in order to attain the goals of the Project set at its onset.

- (1) Assigning sufficient number of man-power to the Project, especially operators, for donated equipment;
- (2) Better management system should be established for more effective utilization of equipment provided to the Project;
- (3) Increased counterpart budget for local cost for the Project activities;
- (4) Closer communication among participating institutions.

The purpose of this Survey Team was to carry out on-site survey on the progress by Indonesia in the requested efforts as described above over the past year and to discuss with the officials responsible for participation of institutions on the problems in promoting the Project.

By the survey of the current Survey Team, we are happy to learn that the local cost at LIPI institutions have been improved. On the other hand, however, we regret to have found out the following problems.

- (1) The number of operators at P3FT has decreased and there is large possibility that maintenance of donated equipment may not be done adequately provided the number of operators would not increase to a large extent;
- (2) Researchers of the participating institutions, especially qualified university students, have difficulty using the equipments partly due to management system;

Regarding the exchange of researchers, four long-term experts and twenty-five short-term experts have visited Indonesia from Japan and fourteen researchers from Indonesia including one researcher from Philippines have been received in Japan. Through these exchanges, many new trends in science and technology on polymeric materials have been successfully transferred into Indonesia. Furthermore, as multi-lateral activities, a lot of communications between Indonesian and other ASEAN researchers have been held in a variety of forms.

On the other hand, more than thirty equipments including those scheduled for this fiscal year will have been donated (ANNEX II). It can be said to be an urgent task for both Japan and Indonesia to seek ways for those equipments to be utilized by

the participating institutions not only during the Project term but also after the termination of the Project in a sufficiently effective manner.

In case where man-power for the donated equipments is not expected to increase and where it is not be able to be ascertained to maintain the donated equipments in good conditions, we may have to consider it to be appropriate that some equipment is located at other participating institutions which already have scientific and technological basis on those equipments.

If some equipments are transferred to other institutions, those institutions are responsible for the maintenance and arrangement to facilitate the utilization by the other institutions not only during the Project term but also after the Project. We think that it is also important to note that the acquire of necessary budget by those institutions is inevitable for the maintenance of those equipments.

Regarding the donated equipments, when other ways to solve the problems are proposed, I would be happy to see that Japan and Indonesia would discuss on them for possible agreement.

I also hope that Indonesian side will give answers to JICA as regards the maintenance and management of donated equipments by the end of January, 1991.

As above, I have made honest and direct indications of the problems regarding the promotion of this Project, and I sincerely hope you would understand that the Project has those problems.

From heart, I would hope to have your continuous and kindest cooperation on the promotion of the Project.

Yours Sincerely,

Michihiko Asai, Ph.D.
The Leader, Japanese Advisory Survey Team

16 December, 1991
Jakarta, Indonesia

The circumstances of the Project's commencement

1) In 1983 when Mr. Nakasone, the Prime Minister of Japan, made a visit to ASEAN countries, cooperation in science and technology was proposed with a viewpoint that Japan and ASEAN countries would share science and technology. After a series of diplomatic discussions, cooperation was requested in 1984 by the ASEAN countries in the following three leading fields; biotechnology, microelectronics and material sciences. In responding this request, research proposals from every Ministry were called for in Japan, and Research Institute for Polymers and Textiles (RIPT), Agency of Industrial Science and Technology (AIST), Ministry of International Trade and Industry (MITI) made a proposal on polymeric materials.

2) At 12th ASEAN-COST, the research project on polymeric materials proposed by RIPT, in the filed of material sciences, was assigned to be hosted by Indonesia, National Institute of Physics (LFN; currently Research and Development Centre for Applied Physics (P3FT)). At the same time, only material sciences out of those three fields were requested by ASEAN countries to be carried out as a project-type cooperation with providing equipment in addition to sending experts and accepting ASEAN researchers. Therefore, Japan responded to this request with the form of project-type technical cooperation of Japan International cooperation Agency (JICA).

3) In August, 1985, Japanese Contact Mission (MOFA, AIST, RIPT & JICA) visited LIPI and discussed with Mr. Muhammadi (LIPI), Mr. Arjuno and Dr. Kahar (P3FT). At first, Indonesia proposed "wood chemistry" which did not match well with Japanese research proposal, but after discussion, the Japanese proposal was basically agreed. At the same time, Japan asked for participation of institutions in Bandung as following in addition to P3FT as the focal point; Research and Development Centre for Applied Chemistry (P3KT), Institute for Research and Development of Textile Industry (IRDIT), Institute for Research and Development of Cellulose Industry (IRDCI) and Bandung Institute of Technology.

4) In October - November, 1985, Japanese Survey Mission (RIPT) visited Indonesia and discussed with Dr. Kahar, and project framework was agreed on necessary equipments, research topics, frequency and number of research personnel transfer, and nomination of research institutions for the cooperation. At the same time, with the supplementary condition that "the Indonesian co-leader is responsible on the management of those equipments in terms of necessary maintenance as well as the arrangement to facilitate the research groups to use the facilities for their research programs", it was agreed that donated equipments were to be located at LFN laboratory and that LFN was to ask for participation of those institutions described above.

5) In December, 1985, Japanese Implementation Survey Team (RIPT, AIST & JICA) visited Indonesia and discussed with Mr. Muhammadi and Mr. Arjuno, and Record of Discussions (R/D) was signed by the both sides. In February, 1987, Japan and ASEAN signed the umbrella minutes as regards Japan-ASEAN Cooperation on Material Science and Technology. In July, 1987, another Japanese Implementation Survey Team (MITI, RIPT & JICA) visited Indonesia and both sides signed R/D. In October, 1987, this project started.

Provision of Equipment

FY 1987

- | | |
|--|------|
| 1) Thermal analyzer (DSC, TG, DTA, TMA) | [TA] |
| 2) Fourier Transform infrared spectrometer | [IR] |

FY 1988

- | | |
|---------------------------------|------|
| 3) Gel permeation chromatograph | [GP] |
| 4) X-ray diffraction apparatus | [XD] |
| 5) Visco-elastometer | [VE] |
| 6) Test extruder | [TE] |

FY 1989

- | | |
|----------------------------------|------|
| 7) Weathering tester | [WT] |
| 8) Instron tester | [IT] |
| 9) Creep tester | [CT] |
| 10) Flow tester | [FT] |
| 11) Scanning electron microscope | [SE] |

FY 1990

- | | |
|----------------------------------|------|
| 12) Injection moulding apparatus | [IM] |
| 13) Wood impregnating apparatus | [WI] |
| 14) Refiner-reactor | [RR] |
| 15) Hot and cold press | [PR] |
| 16) Stereo polarizing microscope | [PM] |
| 17) Aging tester | [AG] |
| 18) Pelletizer | [PT] |
| 19) Hardness tester | [HT] |
| 20) Abrasion tester | [AB] |
| 21) Tube die | [TD] |
| 22) Microtome cutter | [MC] |
| 23) Density meter | [DM] |

FY 1991

- | | |
|---|------|
| 24) Nuclear magnetic resonance spectrometer | [NM] |
| 25) Reverse osmosis / Ultrafiltration apparatus | [RU] |
| 26) Light scattering apparatus | [LS] |
| 27) Hollow fibre spinning apparatus | [HF] |
| 28) Vapour pressure osmometer | [VP] |
| 29) Pulp colour reversion apparatus | [PC] |
| 30) Gas chromatograph | [GC] |
| 31) Glossmeter | [GM] |
| 32) Fatigue tester | [FG] |

2. 調査団作成進捗状況報告書

JAPAN-ASEAN COOPERATION
ON
CHARACTERIZATION OF POLYMERIC MATERIALS

I Introduction:

The cooperation Project, started on October 1, 1987 and planned for five years, has mostly been carried out smoothly in general in providing equipment, sending Japanese experts, accepting ASEAN researchers and implementing multi-lateral activities. With less than one year remaining for the Project, it is now time to discuss how to successfully close the Project. By carrying out an on-site survey during December 9 - 16, 1991, Japanese Advisory Survey Team especially investigated problems with the Project at this moment, and discussed with those concerned to find out ways to solve problems through exchanging views and opinions.

II Progress of Project (December 1990 - November 1991)

1. Japanese Technical Guidance Team : December 6 - 16, 1990
Dr. Yoshio Suda, Hiroji Sasaki, Dr. Michihiko Asai (RIPT),
Mr. Eishi Takamori (JICA)

Mid-term evaluation of the Project

2. Despatch of Long Term Japanese Experts to Indonesia
 - a. Dr. Masatoshi Iguchi (Japanese Project Team Leader)
September 13, 1990 - September 30, 1992
 - b. Mr. Yoshikazu Kashiro (Japanese Technical Advisor)
February 18, 1990 - February 17, 1992
 - c. Mr. Chiaki Makino (Japanese Project Team Coordinator)
November 8, 1988 - September 30, 1992

3. Despatch of Short Term Japanese Experts

(1) For FY 1990

- a. Dr. Yasushi Watanabe (RIPT) February 8 - March 27, 1991
"Degradation behavior of Polymers"
Participation in symposium and collaborative research work
- b. Dr. Mutsumasa Kyotani (RIPT) February 28 - March 27, 1991
"Morphological properties of crystalline polymers"
Participation in symposium and collaborative research work
- c. Dr. Toshiaki Ougisawa (RIPT) February 28 - March 10, 1991

"Phase behavior and modulated structure in rubber blends"

Participation in symposium

(2) For FY 1991

- a. Mr. Koji Igei (Tokyo Clutch-Door) May 12 - 26, 1991
"Wood impregnating apparatus"
- b. Dr. Hiroyuki Sasabe (IPCR-RIKEN) November 23 - December 2, 1991
"Conductive polymer films"
- c. Mr. Akio Kinugawa (Toray Research Center) November 23 - December 13, 1991
"Instrumental analysis"

4. Invitation of Indonesian Researchers to Japan

(1) For FY 1990

- a. Ms. Araceli J. Magsino (Philippines) June 26 - December 23, 1990
"Structure and properties of polyetheretherketone films"
with Dr. Kazuo Nakayama, Dr. Mutsumasa Kyotani and Dr. Akira Kaito (RIPT)
- b. Mr. Sunit Hendrana (P₃FT) August 9, 1990 - February 16, 1991
"Characterization of untreated and treated polyethylene and polypropylene"
with Mr. Yasushi Watanabe and Dr. Kazuo Nakayama (RIPT)
- c. Mr. Rahmat Satoto (P₃FT) January 8 - August 17, 1991
"X-ray diffraction of semi-crystalline polymers"
with Dr. Kazuo Nakayama and Dr. Akira Kaito (RIPT)

(2) For FY 1991

- a. Dr. Isminingsih Gitopadmoyo (IRDITI) October 16 - December 21, 1991
"Cationic dyability of modified poly(ethylene terephthalate) fibres"
with researchers in Toray Co. Ltd. and Dr. Tatsuko Hatakeyama (RIPT)
- b. Dr. Veronica S. Praptowidodo (ITB-TK) October 27 - December 21, 1991
"Pervaporation of liquid mixtures"
with Mr. Tashi Iwatsubo and Dr. Kensaku Mizoguchi (RIPT)

5. Provision of Equipment

(1) For FY 1990

- a. Injection moulding apparatus (Nissei Plastic) February, 1991
dies, cooler, resin dryer
- b. Wood impregnating apparatus (Tokyo Clutch-Door) May, 1991
2 vessels
- c. Refiner-reactor (Hosokawa Micron/Satake Chemical Equip.) March, 1991
refiner and kneader
- d. Hot and cold press (Gonno Oil Press) 30 ton: March, 1991

- e. Stereo polarizing microscope (Nikon) with camera: March, 1991
- f. Aging tester (Tabai Espec) gear oven, 60 cm: March, 1991
- g. Pelletizer (Toyo Seiki) cold type for Plastmill: March, 1991
- h. Hardness tester (Shimadzu) Rockwell type: March, 1991
- i. Abrasion tester (Toyo Seiki) Taber type: March, 1991
- j. Tube die (Toyo Seiki) for Plastmill: March, 1991
- k. Microtome cutter (Nippon Microtome) with microscope: March, 1991
- l. Density meter (Shibayama) density gradient tube: March, 1991
- p. Vacuum system: locally purchased: February, 1991

6. Provision of Accompanied Equipment

Fundamental tools, Spare parts, Polymer samples, Experimental consumables

7. Multi-lateral Activities

- (1) 4th Japan-ASEAN Meeting: September 3 -5, 1991, Manila, Philippines

Dr. Makoto Kodama, Dr. Masatoshi Iguchi (Japanese Team)

Dr. Arjuno Brojonegoro, Dr. Wiwik S. Subowo, Dr. Noer M. Surdia

(Indonesian Team)

Discussions on multilateral activities, Termination of the Programme

- (2) For FY 1990

- a. Training: November 3 - 30, 1990

"The Characterization of polymeric materials"

Brunei(1), Malaysia(1), Philippines(1), Thailand(1) and Indonesia(7)

- b. Collaborative research work: December 1, 1990 - February 28, 1991

"Characterization of rubber-modified polypropylene"

Philippines: Ms. Elionor L. Bedia (ITDI)

Indonesia: Ms. Nuri Astrini (P₃KT)

Indonesia: Mr. Aris Sudarsiman (P₃FT)

"Characterization of degraded polyvinyl chloride"

Malaysia: Mr. Salleh Omar (SIRIM)

Indonesia: Mr. Suharsono (PERTAMINA)

Indonesia: Mr. Ariant Abduchman (P₃FT)

- c. Seminar: March 6 - 9, 1991

"First ASEAN-Japan Symposium on Polymers"

(Third Indonesia-JICA Polymer Symposium-cum-Workshop)

Brunei(2), Malaysia(3), Philippines(3), Singapore(3), Thailand(3)

Japan(5) and Indonesia(87)

- d. Invitation of researcher from Singapore: February 3 - 7, 1991

Dr. Goh Suat Hong (National University of Singapore)
"Polymer blending"

(2) For FY 1991

- a. Training: September 30 - October 25, 1991
"Effect of UV irradiation on polypropylene"
Brunei(1), Malaysia(1), Singapore(1) and Indonesia(2)

"Change of crystallinity and orientation of thermoplastic polymers during drawing"
Philippines(1), Thailand(1) and Indonesia(2)
- b. Collaborative research work: September 22 - December 22, 1991
"Modification of silk-fibres through graft-polymerization"
Thailand: Ms. Sireerat Charachindra (Dept. Industrial Promotion)
Indonesia: Ms. Kuntari Sasas (IRDTI)

"Utilization of bacterial cellulose for composite materials"
Philippines: Ms. Paglicawan Marissa (ITDI)
Indonesia: Ms. Wieke Pratiwi (IRDCI)
- c. Invitation of researcher from Thailand: October 20 - 26, 1991
Dr. Ju Sirijutaratana Covavisaruch (Chulalongkorn University)
"Deformation and fracture of polymers"
- d. Study tour:
Mr. Soetrisno T. Sudirjo and Dr. Masatoshi Iguchi to Thailand
September 16 - 21, 1991
Dr. Veronica S. Praptowidodo and Mr. Yoshikazu Kashiro to Malaysia
September 20 - 27, 1991
Dr. Tjia May On and Dr. Masatoshi Iguchi to Singapore
September 22 - 27, 1991

III Work Plan for FY 1991/1992:

1. Despatch of Long Term Japanese Experts to Indonesia
 - a. Dr. Masatoshi Iguchi (Japanese Project Team Leader)
September 13, 1990 - September 30, 1992
 - b. Mr. Yoshikazu Kashiro (Japanese Technical Advisor)
February 18, 1990 - February 17, 1992
 - c. Mr. Chiaki Makino (Japanese Project Team Coordinator)
November 8, 1988 - September 30, 1992
2. Despatch of Short Term Japanese Experts to Indonesia

- (1) For FY 1991
 - a. Dr. Toshihiro Hirotsu (RIPT): February, 1992; 1 month
"Surface modified polymer membrane"
- (2) For FY 1992
 - a. Researchers:
 - b. Experts:
Installation and training for equipment provided in FY 1991 - 1992
3. Invitation of ASEAN Researchers to Japan
 - (1) For FY 1991
 - a. Ms. Hendayani Teguh Adisesha (IRDICI): March - April, 1992
"Characterization of cellulose derivatives"
 - (2) For FY 1992: April - September, 1992
 - a. Researcher (ITB-K)
 - b. Researcher (ITB-P)
 - c. Researcher from other ASEAN country
4. Provision of Equipment
 - (1) For FY 1991: Shipping in February - March, 1992
 - a. Nuclear magnetic resonance spectrometer (JEOL)
 - b. Reverse osmosis/Ultrafiltration apparatus (Nitto Denko)
 - c. Light scattering apparatus (Wyatt Technology)
 - d. Hollow fibre spinning apparatus (Sugiyama-gen)
 - e. Vapour pressure osmometer (Corona Electric)
 - f. Pulp colour reversion apparatus (Toyo Seiki)
 - g. Gas chromatograph (Shimadzu)
 - h. Glossmeter (Murakami Color Res. Lab.)
 - i. Fatigue tester (Toyo Seiki)
 - (2) For FY 1992
5. Provision of Accompanied Equipment
Fundamental tools, Spare parts, Polymer samples, Experimental consumables
6. Multi-lateral Activities
Based on the minutes of 3rd Japan-ASEAN Meeting signed on August 29, 1990 in Genting Highlands, Malaysia, the following activities are to be implemented.

(1) For FY 1992

a. Training: 4 weeks in June, 1992

"Characterization of polymeric materials"

1 junior researcher from each ASEAN country plus 10 from Indonesia

b. Seminar: 2-3 days in July 1992

"Third ASEAN-Japan Symposium on Polymers"

(Fourth Indonesia-JICA Polymer Symposium-cum-Workshop)

3 researchers from each ASEAN country plus others from Indonesia

c. Third ASEAN Science and Technology Week: September 1992, Singapore

Participation of Japanese and Indonesian researchers in Conference

8. Tentative Implementation Schedule (ANNEX)

IV Miscellaneous:

1. Management of the Project

- cooperation among institutions
- utilization of equipment
- staff and operator
- local budget

2. Activities in Indonesia

- Progress of Sub-projects
 - membrane, synthetic fibre, pulping, CM-wood, polymer blend, conducting polymers, polymer degradation etc.
- Meeting
 - One day colloquium, Training, Indonesia-JICA polymer symposium
- Follow-up of results
- Analytical service
- Establishment of "BANDUNG POLYMER GROUP"

3. Activities with ASEAN Countries

4. Others

TENTATIVE IMPLEMENTATION SCHEDULE (FY 1991 - FY 1992)

ANNEX

ACTIVITIES	TIME																								
	FY 1991						FY 1992																		
	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
1. Preparation Japanese Mutual Consultation Team Japanese Project Leader Meeting Japan-ASEAN Meeting																									
2. Assignment of Japanese Experts Long Term Short Term (Research Equipment																									
3. Invitation of ASEAN Researchers to Japan FY 1990 P ₃ FT FY 1991 IROTI ITB-TK IROCI FY 1992 FY 1990																									
4. Provision of Equipment Injection moulding Wood impregnation Refiner-reactor Miscellaneous FY 1991 NMR Reverse osmosis/ultrafiltration Light scattering Vapour pressure osmometer Miscellaneous FY 1992																									
5. Indonesia-JICA Polymer Symposium																									
6. Multi-lateral Activities Seminar Training in Indonesia Collaborative Research																									
7. Report and Evaluation																									

3. プロジェクト側作成進捗状況報告書

ASEAN-JAPAN COOPERATION PROGRAMME
ON MATERIALS SCIENCE AND TECHNOLOGY

Indonesia Project : Characterization of Polymeric Materials

PROGRESS REPORT

April 1991 to November 1991

(FY 1991/1992)

I. INTRODUCTION

The Characterization of Polymeric Materials is one of the project under the ASEAN-Japan Cooperation Programme on Materials Science and Technology. It was started on October 1, 1987 for the duration of five years and the implementing agency is the R & D Centre for Applied Physics of the Indonesian Institute of Sciences. This project will come to an end on September 30, 1992.

The objective of the project is to strengthen the technological basis for the characterization of polymeric materials in the ASEAN region in general and particularly in Indonesia. The main component of activities in this project include the assignment of Japanese Experts, provision of machinery and equipment, sending of Indonesian and other ASEAN personnel to Japan for research training, and promoting cooperation among the ASEAN through trainings/seminars/workshops and collaborative research works.

During the course of the project, research activities

have been promoted in the groups within the Indonesian participating organization as the sub-project members. Efforts have also been done to strengthen inter-group linkages and net-working among research groups in Indonesia, especially in Bandung.

This report will present the progress of activities in fiscal year 1991/1992. It covers the activities between April 1991 to November 1991 and also the activities which have been committed to be done in 1992, before the end of the project. Progress report for activities between September 1990 to August 1991 has been given in the Joint Meeting held in Manila in September 1991.

II. SUMMARY OF EVENTS

1. Project Management

The Project is jointly implemented by the Japanese Project Team and The Indonesian Project Team. In the Indonesia side the Project Team consists of the Project Management and Coordinator Team and Sub-Project Members. During this fiscal year, there are seven sub-project members actively involving in the technical activities of this project : group from R & D Centre for Applied Physics (RDCAP-LIPI); group from R & D Centre for Applied Chemistry (RDCAC-LIPI); group from Department of Physics-ITB; group from Department of Chemistry-ITB; group from Department of Chemical Engineering-ITB; group from Institute for R & D of Cellulose Industries (IRDCI-Dept of Industry); group from Institute for R & D of Textile Industries (IRDTI-Dept of

Industry).

Management Meeting is the means to execute the management aspects of this project. There are two types of Management Meeting to run this project :

1. Regular Meeting is conducted regularly to evaluate the progress and programme planning. It was conducted every week and attended by the Indonesian Project Team Leader and Coordinator, JICA Project Team Leader, Coordinator and Long Term Expert.
2. Management Meeting is conducted every two months to discuss the overall management aspects of the Project. The Meeting is attended by the member of Management Meeting I and the Coordinator of Sub-Projects (seven sub-projects). During this fiscal year, the meeting has been conducted on 20 April, 24 June, 9 August and 22 November 1991.

The fourth Joint Meeting of ASEAN-Japan Cooperation Programme on Materials Science and Technology has also been conducted during this fiscal year. It was conducted in Manila on 3-5 September 1991. This project has been represented by Japanese Project Team (Dr. Masatoshi Iguchi) and Indonesia Project Team (Mr. Arjuno Brojonegoro, Prof. Dr. N.M. Surdia and Dr. Wiwik S. Subowo).

2. Assignment of JICA Expert

a. Long-term Expert

Three long-term experts in the project during this fiscal year, are the following :

1. Dr. Masatoshi Iguchi-JICA Project Team Leader
2. Mr. Chiaki Makino - JICA Project Coordinator
3. Mr. Yoshikazu Kashiro - JICA Expert

b. Short-term Expert

1. Mr. Koji Igei from Engineering Department of Tokyo Clutch-Door Co Ltd. was in Bandung from 13 to 26 May 1991. During his stay in Indonesia, the project organized two-day-training workshop on the operation and utilization of Wood Impregnation Equipment. The Indonesian instructor in this training workshop was Ir. Subiyakto.
2. Dr. Hiroyuki Sasabe from the Institute of Physical and Chemical Research (RIKEN) of Japan was in Bandung from 23 November to 2 December 1991. He is working with the sub-project at Department of Physics-Institute Technology of Bandung and helping advice on conductive polymer project. During his stay in Bandung he gave a lecture on Recent Status of Molecular Electronics and Bioelectronics polymers.
3. Mr. Akio Kinugawa from Toray Research Center Inc.; Japan was in Bandung from 30 November to 13 December 1991. During his stay in Indonesia, the project organized eight day-training workshop on Advanced utilization of GPC.

3. Provision of Equipment

For the FY 1991, JICA will provide equipment to the Project. The list of equipment is the following :

1. Nuclear magnetic resonance
2. Reverse osmosis/ultrafiltration apparatus
3. Light scattering apparatus
4. Hollow fiber spinning apparatus
5. Vapour pressure osmometer
6. Pulp colour reversion apparatus
7. Gas chromatograph
8. Glossmeter
9. Fatigue tester

In addition to that, JICA also provide the project with some small equipment and materials through the scheme of accompanied baggage such as Polarizing Microscope, Hot Press machine, Cooling bath etc. and supplementary budget for purchasing small equipment and chemicals locally.

4. Training Programme

a. Indonesian Staff to Japan

Two Indonesia research staffs sent to Japan for research training, are the following :

1. Dr. Isminingsih Gitopadmoyo of the Institute for R & D of Textile Industries,
2. Dr. Veronica Susilowati Praptowidodo of Chemical Engineering Department of Bandung Institute of Technology.

b. National programme

1. Training on the operation and utilization of Wood Impregnator Apparatus. The programme was conducted at RDCAP-Bandung on 21-22 May 1991.
2. Training on the operation and utilization of Injection Moulding Apparatus. The programme was conducted at RDCAP-Bandung on 2-4 July 1991. The participants in this training came from ten institutions from Bandung, Jakarta and Bogor.
3. Training on utilization of GPC-I was conducted on 11-13 November 1991 in RDCAP-Bandung. This training was organized as preliminary for the second training (Advanced Training).
4. Advanced Training on utilization of GPC was conducted on 3-11 December 1991 in RDCAP-Bandung. Mr. Akio Kinugawa, Expert of Instrumental Analysis was the instructor in the training programme.

5. Multilateral Activities

a. Regional Training Programme

Regional Training on Characterization of Polymeric Materials which was attended by participants from ASEAN and Indonesia, was conducted on 28 September - 27 October 1991 at RDCAP-LIPI, Bandung. The participants was splitted in two groups to conduct research on the topics of :

1. Effect of UV-Irradiation on Polymers
2. Change of Crystallinity and Orientation of PET during Drawing.

Participants :

Brunei Darussalam : Ms. Agnes Lee Mei Lin
Indonesia : Mr. Muchjin Akip (UNSRI)
 : Mr. Mimpin Sitepu (USU)
 : Mr. Abubakar Hadis (UNAND)
 : Mr. Haroem Poedjiarno
 (P.T. Kimia Farma)
Malaysia : Mr. Mansoor bin Hj. Mohd. Saman
Philippines : Ms. Adelaida G. Senica
Singapore : Ms. Ng Pek Choo
Thailand : Mr. Parinya Aroonvisoot

Lecturer :

Prof. Dr. N.M. Surdia (Dept of Chemistry-ITB)
Dr. Nilyardi Kahar (RDCAP-LIPI)
Dr. Cynthia Radiman (Dept of Chemistry-ITB)
Dr. Roestamsjah (RDCAC-LIPI)
Dr. Masatoshi Iguchi (JICA Project Team Leader)
Dr. Ju S. Covavisaruch (Thailand)

Research Project Supervisor

Dr. Wiwik S. Subowo
Dr. Masatoshi Iguchi

Instructors

Mr. Arianto Abdurachman
Mr. Mundiri
Mr. Sunit Hendrana

Ms. Lucia Indrarti
Mr. Hans K. Sudjono
Dr. Kreshna Amurwabumi
Mr. Zubaidi
Mr. Herlan Abbas
Mr. Rahmat Satoto
Ms. Sri Pujiastuti
Ms. Emmie
Ms. Ipit Karyaningsih
Ms. Djimat Lisnawati

b. Collaborative Research

The Collaborative research in FY 1991/1992 is being conducted in Bandung-Indonesia from 22 September - 21 December. There are two research topics in this programme :

1. Team I : Graft Copolymerization of Monomer on to Silk Fibre

Researchers : a. Ms. Sireerat Charuchinda (Thailand)
b. Ms. Kuntari Sasas (Indonesia)

2. Team II : Development of Composite Materials Utilizing Bacterial Cellulose

Researchers : a. Ms. Marissa A. Paglicawan (Philippines)
b. Ms. Wieke Pratiwi (Indonesia)

Both research activities are still on-going.

6. Research Activities

The on-going research activities in FY 1991/1992 are the following :

1. R & D Centre for Applied Physics (P3FT-LIPI)
 - a. Preparation and characterization of CM-rubber wood
 - b. Utilization of CM-wood in adhesives
 - c. Characterization of rubber product
 - d. Degradation of Polypropylene
 - e. Rheological characteristic of PP and PS in injection moulding
 - f. Blending of polymers

2. R & D Centre for Applied Chemistry (P3KT-LIPI)
 - a. Characterization of polymer used in adhesives
 - b. Compatibility of polymeric binary mixtures
 - c. Membrane for ultra filtration and reverse osmosis

3. Institute for Research and Development of Cellulose
 - a. Utilization of Carboxymethylated wood in drilling mud
 - b. Research on Cellulose and its Characteristics
 - c. Research on Lignin and its Characteristics
 - d. Research on Hemicellulose and its Characteristics

4. Institute for Research and Development of Textile Industries (IRDTI)
 - a. Utilization of Carboxymethylated wood in Textile Printing
 - b. Characterization of modified and unmodified PET
 - c. Characterization of modified and unmodified Cellulose Rayon Fibres

5. Physics Department ITB

- a. Synthesis and Characterization of Conducting Polymers
- b. Refinement of program for calculating electronic structure of polyacetylene

6. Chemistry Department ITB

- a. Degradation studies of polymers
- b. Clarification of Turbid Water by Hollow Fibre Modul
- c. Characterization of Polymer Blends

III. ACTIVITIES FOR 1992

1. Regional Symposium on Polymers;

The Second ASEAN-Japan Symposium on Polymers was agreed during Joint Meeting in Manila, to be conducted before August 1992 in Indonesia.

2. ASEAN Regional Training Programme;

During Joint Meeting in Manila, it also agreed to organize the ASEAN Regional Training Programme in 1992.

3. Continuation of on-going research within the Sub-Project Activities

4. Provision of Equipments, Chemicals, Spareparts

5. Training and expert from Japan.

IV. CONCLUDING NOTES

With reference to the Master Plan of this Cooperation Programme, this project has very good progress in terms of strengthening the technological basis for the characterization of polymeric materials in ASEAN,

particularly in Indonesia.

1. The assignments of Japanese Experts have provided tremendous assistance in improving the skill and capability of Indonesian staffs in dealing with various methods of polymeric materials characterization.
2. The provision of equipment by JICA has constructed set of reliable facilities for characterization and promoting R & D activities in the field of polymers in Indonesia. This set of facilities will become very valuable assets of the polymer science community in Indonesia to promote their research activities now and in the future.
3. Training programme in Indonesia and in Japan have improved the skill and capability of Indonesian staffs in conducting measurements, analysis and research. More over through training programme a kind of net-working among researchers has been established not only in Indonesia but also in the other ASEAN region.
4. Research activities which were promoted during this project are becoming very useful momentum in mobilizing research capacity and initiating interaction among research groups in Indonesia. However, it is just the begining and it will take some time before the real results of this endeavour will make good contribution to the growth of polymer science and technology.

All those successful achievement as the results of project activities perhaps will require further follow-up in the future to strengthen research capacity of polymer groups in Indonesia.

4. サブプロジェクト進捗状況報告書

PROGRESS REPORT ON RESEARCH ACTIVITY

FY 1991/1992

Sub project : Research and Development Centre for Applied Physics-LIPI

Research activity :

a. Preparation and Characterization of CM-rubber Wood

Preparation of CM-rubber wood was conducted by etherification of ground rubber wood with particle size of 60 and 140 mesh. The result was characterized on the degree of substitution (DS) and viscosity.

It was found that the degree of substitution of CM-rubber wood with smaller particle size is higher than larger particle size, i.e. 0.72 and 0.52 respectively and therefore the viscosity of smaller particle size was higher than the other.

Further research was done on the utilization of CM-rubber wood. It is well known that aqueous solution of CMC possesses adhesive property, so the experiment aimed to seek the possibility of substitution of low grade CMC for adhesive with CM-rubber wood.

b. Utilization of CM-rubber wood in adhesive

Two methods of adhesive preparation were proceeded. The first was by dissolving CM-rubber wood in water (water based) and the second was by phenolysis.

The characterization of adhesive was conducted on water resistance and shearing strength. The result shows the water based adhesive with 140 mesh and 60 mesh particle size could stand in cold water 381 minutes and 272,5 minutes respectively. However it was not resist in boiling water. The shearing strength was 14,4 kgf/cm² for smaller particle size and 6,9 kgf/cm² for larger particle size.

The phenolysis adhesive was added by crosslink agent, 4,4-diphenylmethane diisocyanate (MDI), before it was applied to the adherends, and then curing was conducted at 175°C while it was pressed. The result shows that the adhesion was resist both in cold and in boiling water (4 hours). The tensile strength could reach 44,16 kgf/cm² for smaller particle size and 19,37 kgf/cm² for larger particle size.

c. Characterization of rubber product

The rubber product which was chosen to be tested were shock absorber, break seal and mud guard. The characterization was conducted on hardness, tear resistance and compression set.

The result is as follows :

Test item	Sample		
	Shock absorber	Break seal	Mud guard
1. Hardness	86	66	94
2. Tear resistance (N/mm ²)	6.8	-	6.1
3. Compression set (%)	37.05*	-	9.77**

* At 25%, 70°C, 22 hours

** At 400 lb (181,4 kg), 70°C, 22 hours (based on ASTM D 395-61)

The result of testing will be used in comparison of formula that will be tried to be made.

d. Degradation of Polyolefine by weathering

1. Polypropylene

The research programme is aimed to study the effect of super-molecular structure and additives on the degradation of Polypropylene. Sample preparation by means of hot-press is the important starting point to get the proper crystallite form through a certain quenching procedure.

Polypropylene samples which have been used, have different melt flow rate (MFR), i.e. MFR 25, 11, 4 and 1. Additives which have been used were BHT (antioxidant). Tinuvin 326 (UV absorber) and Irganox 1076 (antioxidant).

Characteristic of samples to be tested will be the crystall structure, the properties of wheathered samples and the photo-oxidation mechanism.

2. Polyethylene

Polyethylene standard material has been exposed in the open air in Bandung, Indonesia and Tsukuba, Japan. The evaluation of materials is conducted by using FT-IR to observe the Carbonyl growth in the samples. Some data which cover the period between March 1991-July 1991 have been obtained.

e. Blending of PET and Nylon

An activity to study polyblend has been initiated by using PET and Nylon. Blend samples have been prepared with the composition of PET ranging from 0%, 20%, 40%, 50%, 60%, 80% and 100%, Characterization of samples is yet to be done.

f. Rheological Characteristic of Polymer in Injection Moulding

Activity to study the rheological characteristic of Polystyrene in Injection Moulding was started in collaboration with group from chemical engineering of ITB. It is at the preliminary stage and hope to be conducted further in the future.

PROGRESS REPORT FY 91/92 OF SUBPROJECT ON
CONDUCTING POLYMERS CONDUCTED AT PHYSICS DEPARTMENT,
BANDUNG INSTITUTE OF TECHNOLOGY

Background

The subproject on conducting polymers which is partially albeit strongly supported by the ASEAN JAPAN PROJECT within the JICA-LIPI cooperation scheme was actually started at the physics Department of ITB since 1989 when Dr. Suparno Satira was invited to RIPT for a five-month cooperative research on the synthesis of alkyl polythiophenes. With the subsequent arrival of JICA donated equipments for electrochemical synthesis, the conducting polymers subproject became firmly established at the physics department. Prior to this, early attempts by Dr. Suparno on catalytic synthesis of polyacetylenes had not been pursued beyond its preliminary stage. On the other hand, theoretical studies on general conjugated hydrocarbon molecules have been consistently carried out since 1986.

Outline of Long Term Planning and Objectives

The subproject on conducting polymers has been conceived as an important part of the broader program for the studies and development of polymeric and organic materials for electronic, optoelectronic and photonic applications. In the next ten years, the research activities are expected to cover the conducting, semiconducting, and superconducting

materials as well as nonlinear optical materials. While this may sound too widely spread out, they are actually rather closely related fields of study in the research area of advanced material science and technology.

Electrochemical processes have been chosen as the main synthetic method at the initial stage, although chemical processes such as the Durham procedure may also be considered in the near future. At a later stage, physical vacuum deposition and photochemical polymerization techniques as well as other thin film techniques will most likely be adopted for the development of device applications. For the purposes of sample evaluation, measurements of specific physical quantities (σ , X etc) along with other standard characterization techniques (XDR, IR, UV-VIS) are being utilized or to be acquired. No less important is the manpower development program, which must be accordingly intensified.

In the next three years, our efforts will be mainly concentrated on mastering the electrochemical and chemical synthesis of all the important conducting polymers, their structural, physical and chemical characterizations as well as their simple applications. In addition to that, the synthesis and study of important non-linear optical materials will also be pursued in the immediate future:

Progress and Present Status

A. Donated Apparatus

Listed below are the apparatus donated so far to the subproject at the physics department.

1. Potentiostat/Galvanostat HA-501, Hokuto Denko Ltd.
2. Function Generator HB-104, Hokuto Denko Ltd.
3. Electronic Voltmeter PM-12R, Toa Electronics Ltd.
4. X-Y Recorder 3086, Yokogawa
5. Analytic Balance, Sartorius
6. Digital Temperature Controller, Iuchi
7. Minidistillator + Membranepum
8. pH meter with electrodes
9. Temperature controller (Iuchi)
10. 4 Transformers

B. Result Achieved Since 1989

1. Two S1 thesis (on synthesis of polythiophenes and derivates)
2. One S2 thesis (on synthesis of characterization of polypyrroles)
3. Papers published abroad and presented at the 1st, 2nd and 3rd Indonesia-JICA Symposia and Workshops, Bandung. 1989, 1990 and 1991 (list attached)
4. Two physics undergraduate students, one chemistry undergraduate student and one physics S2 graduate student are working on their thesis by utilizing those apparatus.

Research Plan for FY 91/92 and Its Present State of Progress

The research plan for FY 91/92 until the completion of the project in September 1992 involves the following programs.

1. Improvement of previous result on the synthesis of polypyrrole by better control of the synthesis condition and more thorough evaluation/characterization of the resulting films.
2. Galvanostation and potentiostatic syntheses of polyanilenes films and their characterizations.

All these activities are well underway, and will be completed between April and August 1992. In addition to these we shall also carry out the

1. Synthesis of polythiophenes and its alkyl derivatives for the study of possible modifications of its physical and chemical properties.
2. Applications of those polymeric films for solar cell or battery fabrications.
3. Theoretical computations for the studies of electronic and optical properties of conjugated systems.

Most of these activities are supported by the existing facilities available in ITB and P3FT, although we will need some support for the improvement of conductivity measurement equipped with cryostat and the purchase of chemicals and other expendables.

Plan for Activities Beyond September 1992

For the development beyond September 1992, however, when the synthesis and studies of thin and ultra thin films will be started, the following major instruments and equipments become urgently needed.

- Film thickness measurement instrument for thickness down to 0.001 μm (or tens of nanometers), such as an ellipsometer, for transparent as well as nontransparent films
- Vacuum deposition equipment and spinner for organic thin film fabrication (10^{-6} - 10^{-7} torr)
- UV - Optical spectrometer
- Optical equipment for performing 4 wave degenerate/non-degenerate phase conjugation measurements of electrical susceptibility tensors.
- Enhanced computational facilities.

Bandung, January 9th 1992



M.O. Tjia

List of papers published abroad or presented at JICA Symposium

1. Kyoji Kaeriyama, Suparno Satira and Hideyaki Masuda, Makromol.Chem. Rapid Commun. 11, 37 (1990)
2. Herman dan M.O. Tjia, "Computerized Qualitative and Quantitative Analysis of Two-Component Optical Spectra", 1st Indonesia - JICA Symposium Cum Workshop on Polymer Characterization, Bandung, April 3-5, 1989
3. R.E. Siregar dan M.O. Tjia, "Computation of Electronic Structure of Polyacetylenes using the scheme of Pariser-Parr-Pople", 1st Indonesia - JICA Symposium Cum Workshop on Polymer Characterization, Bandung, April 3-5, 1989
4. M.O. Tjia dan R.E. Siregar, "Iterative Configuration Interaction in Polyenes", 1st Indonesia - JICA Symposium Cum Workshop on Polymer Characterization, Bandung, April 3-5, 1989
5. Suparno Satira and Kyoji Kaerijama, "Electrochemical Preparation of Poly (3-Methylthiophene), Second Indonesia - JICA Polymer Symposium Cum Workshop, 7-9 March 1990
6. R.E. Siregar and M.O. Tjia, "Empirical Parameters for Calculating Low-Lying Exited States of Polyenes", Proc. Second Indonesia - JICA Polymer Symposium Cum Workshop, Bandung 7-9 March, 1990
7. M.O. Tjia, B. Prasetya and T.B. Lestyaningsih, "Valence Effective Hamiltonian Method for the Determination of Electronic Structure of Linear Polymers", Proc. Second Indonesia - JICA Polymer Symposium Cum Workshop, Bandung 7-9 March, 1990
8. Herman and M.O. Tjia, "Pure Component Extraction form Mixed Spectra by Unconstrained Optimization Method", Proc. Second Indonesia - JICA Polymer Symposium Cum Workshop, Bandung 7-9 March, 1990
9. M.O. Tjia dan B. Prasetya, Studi Struktur Elektronik Trans-Poliasetilen Dengan Metoda Hamiltonian Efektif Valensi (VEH), Proc. Second Indonesia - JICA Polymer Symposium Cum Workshop, Bandung 7-9 March, 1990
10. R.E. Siregar and M.O. Tjia, "Effects of Periodic Defects on The Electronic Structure of Trans-Polyacetylene", Proc. 1st Asean-Japan Symposium on Polymers, Bandung, 6-9 March 1991
11. M.O. Tjia, Widayani and R.E. Siregar, "Effects of Processing Parameters on Polypyrrole Films Prepared By Electrochemical Method", Proc. 1st Asean-Japan Symposium on Polymers, Bandung, 6-9 March 1991

PROGRESS REPORT OF RESEARCH PROJECTS
IN CONJUNCTION OF JICA-LIPI COOPERATION
ON CHARACTERIZATION OF POLYMERS

Team : Chemistry Department ITB (Coordinator Prof. Dr. N.M.Surdia)

Title :

Regular Program - Supermolecular Structure and Degradation Studies of Synthetic Polymers.

Special Program - Interfacial Phenomena of Polyblends.

Results

I. Structure Characterization.

- a) The influence of stretching and heating on polyester - S-2 thesis by I Made Arcana, Chemistry Dept. ITB.

Treatment: Stretching using equipment from LIPI Serpong; heating using equipment from Chemistry Dept. ITB; moulding from LIPI Bandung.

Characterization: FTIR, XRD for degree of crystallinity, DSC and tensile tester from JICA-LIPI equipment.

XRD for degree of orientation from MEch. Eng. Dept. ITB.

Work has been submitted at the ASEAN-JAPAN Symposium in March 1991.

- b) The influence of processing on the supermolecular structure of PET-FOY - S-2 thesis by Susyami from BBT under supervision of N.M.Surdia.

Treatment of yarn: using equipment of BBT.

Characterization: using FTIR, XRD, DSC, tensile strength tester, SEM from JICA-LIPI.

Work has been submitted at the HKI Symposium in Surabaya July 1991.

- c) Diffusion of N₂ and O₂ through various types of PE films (LDPE, LLDPE, HDPE) - S-1 thesis by Achmad Djamiludin, Chemistry Dept. ITB.

Work has been carried out at the Pertamina Research Centre, Pulogadung, Jakarta.

Variations : type of film structure, film thickness and type of gas.

- II. Problem: A similar equipment has been designed at the Mechanical Engineering Department ITB, but no results can be obtained, because of difficulties in getting the right device for pressure measurements and seals.

II. Degradation Studies of Polymers.

- a) Thermal degradation of HDPE and LDPE - S-1 thesis by Dhani Adhiawati, Chemistry Dept. ITB.

Treatment : heating with variation in temperature, with and without air using equipment from ITB (locally made).

Characterization has been carried out by IR, XRD, DSC, tensile tester using ITB equipment.

- b) Weathering of HDPE and LDPE - S-1 thesis by Tuti Rochani, Chem. Dept. ITB.

Exposure: outdoor weathering and UV irradiation using ITB made equipment.

Characterization: IR, XRD, DSC and tensile tester using ITB equipment.

- c) Influence of gamma irradiation on various types of synthetic polymers - S-1 thesis by Mutiah, Chemistry Dept. ITB.

Exposure : done at BATAN, Jakarta.

Characterization: IR, XRD, DSC and tensile tester, molecular weight determination using ITB equipment.

III. Interfacial Phenomena of Polyblends.

- a) Blending of HDPE and LDPE - S-1 thesis by Suparman, Chemistry Dept., ITB.

Type of polymer: nonpolar-nonpolar, both obtained by addition polymerization.

Characterization: Compatibility studies by XRD, DSC, tensile strength using JICA-LIPI equipment.

- b) Blending of PET - PC - S-1 thesis by Wundriari Santosa, Chemistry Dept. ITB.

Type of polymer: polar - polar, both obtained by condensation polymerization.

Characterization: Compatibility studies by XRD, DSC, tensile strength using JICA-LIPI equipment.

- c) Resistivity studies of PE with C Black - S-2 thesis by Minto Sumpeno, staff member from USU Medan under supervision of N.M.Surdia.

Material: LDPE, Carbon Black (Merck), Benzoyl Peroxide.

Variable parameters: benzoyl peroxide content, temperature of heating and cooling.

Method of mixing: by extrusion.

Characterization: DSC, resistivity by equipment from ITB.

Continuation of Program

I. Structure Characterization and Degradation Studies.

- a) Influence of stretching and heating on PP films with varying molecular weight and thickness of films - work is on-going by Ade Permata, Chemistry Dept. ITB under supervision of N.M.Surdia and Nilyardi Kahar.

Samples and characterizations will be carried out using JICA-LIPI chemicals and equipment.

- b) Biodegradation of polymers

(i) Corn flour copolymerized with MMA degraded by micro-organism - work will be carried out by Jumar(S-1 student);

(ii) Degradation of PEG using mixture of microorganism - work will be carried out by Natalia (S-1 student Chemistry Dept. ITB).

II. Interfacial Phenomena of Blends.

- a) The influence of C Black on PE - work will be carried out by Victor (S-1 student).
Material : HDPE, Carbon Black from vegetative origin.
System : with and without benzoyl peroxide.
- b) The role of lignin as adhesive in composites of cellulose waste - work will be carried out by Syahrul (S-1 student under the supervision of N.M.Surdia and Nursyamsu from BBS).
- c) Characterization of resin used in prepack composites - work is on going by Diah Mardiana (S-2 student, staff member from Unibraw Malang under the supervision of N.M.Surdia and Cynthia Radiman.
- d) The influence of C Black on natural rubber - work will be carried out by Suharsono (S-1 student).

Materials

Specification for routine expenses (budget Rp. 6.000.000,-)

I. Membrane group

Apparatus made by Machine Shop Aggandjali

1. Apparatus for flat membrane		Rp. 4.000.000,-
2. Stainless steel knives for cutting of membranes		
0.1 mm 44 x 4 x 5 cm)	} a Rp. 100.000,-	" 300.000,-
0.15 mm 44 x 4 x 5 cm)		
0.20 mm 44 x 4 x 5 cm)		
3. Stainless steel reservoir for membrane doping, 3 L capacity with cover		" 300.000,-
		<hr/> Rp. 4.600.000,-

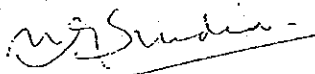
II. Blending group

1. Digital thermometer		Rp. 759.000,- / set
2. Digital Multitester Kingdom (Pocket)		" 105.000,- / unit
3. Ceramic Furnace Tube 2.5 x 70 cm 2 pieces		
2 x Rp. 140.000,-		" 280.000,-
4. Ceramic crucible (boat type) 10 pieces		" 30.000,-
5. Heating element for furnace 2 "		" 145.000,-
6. UV lamp KK 6282 T84		" 20.000,-
KK 6282 T88		" 20.000,-
7. Polyethylene glycoll 6000 2 Kg		" 103.600,-
8. Carbon Black EM 2186 1 Kg		" 125.450,-
9. Dibutyl phtalate 1 L		" 30.000,-
10. Tetrahydrofuran 2.5 L		" 215.650,-

Books and Journals

1. Douglas R. Lloyd (Ed.), "Materials Science of Synthetic Membranes," American Chemical Society, Washington, D.C. USA.
2. Journal of Membrane Science, Elsevier Science Publ., Amsterdam, Netherlands.
3. R.H. Riley, P.A. Case, A.L. Lloyd, C.E. Milstead and Tagami, "Recent Developments in Thin Film Composite Reverse Osmosis Membranes," Desalination, 36 (1981) 207.
4. "Desalination of Seawater by Reverse Osmosis," Edited by Jeanette Scott, Pollution Technology Review No. 75 ISBN-03155-0837-9 (1981), Noyes Data Corporation, Park Ridge, New Jersey, USA.
5. Brandrup, J. and E.H. Immergut (ed.), "Polymer Handbook," 3rd ed. John Wiley, 1989.
6. Daniels, C.A., "Polymers: Structure and Properties," Technomic Publ. AG, Missionstrasse 44, CH-4055 Basel, Switzerland (Fax: 061/43 52 59), 1989. ISBN: 0-87762-552-2, hardcover SFr. 121.--.

Bandung, 8 January 1992



(N.M. Surdia)

MASTER PLAN & PROGRESS REPORT FY 91/92 OF MEMBRANE SUB-PROJECT

STRATEGY :

Membrane sub-project is one of the projects realized in the Department of Chemistry of ITB by the so-called Membrane Group. This group has worked in the field of membrane since 9 years ago.

Membrane filtration has not been extensively applied in Indonesia, because membranes and apparatus are very expensive. If both can be made by ourselves in Indonesia through researches and developments of membrane technology, this would enlarge the applications of membrane filtrations. Moreover, this kind of research will open the possibility of improving the knowledge and mastering the technique of membrane preparation.

MASTER PLAN :

Based on the strategy, the plan of research activities in membrane sub-project is designed as follows :

1. preparation of membranes

* scientific aspects :

- study of several parameters i.e. type of polymer, solvent and additives; composition of mixture; temperature etc.
- type of membranes : flat membranes and hollow fibers.
- research on special polymers to obtain specific application

* technical aspects :

- construction of equipments.

In certain condition where the equipments are not available commercially, it must be designed and made locally.

2. characterization of membranes

- construction of apparatus/equipment used for certain characterization
- permeability and permselectivity
- pore dimension
- structural characterization
- mechanical properties etc.

3. application of membranes

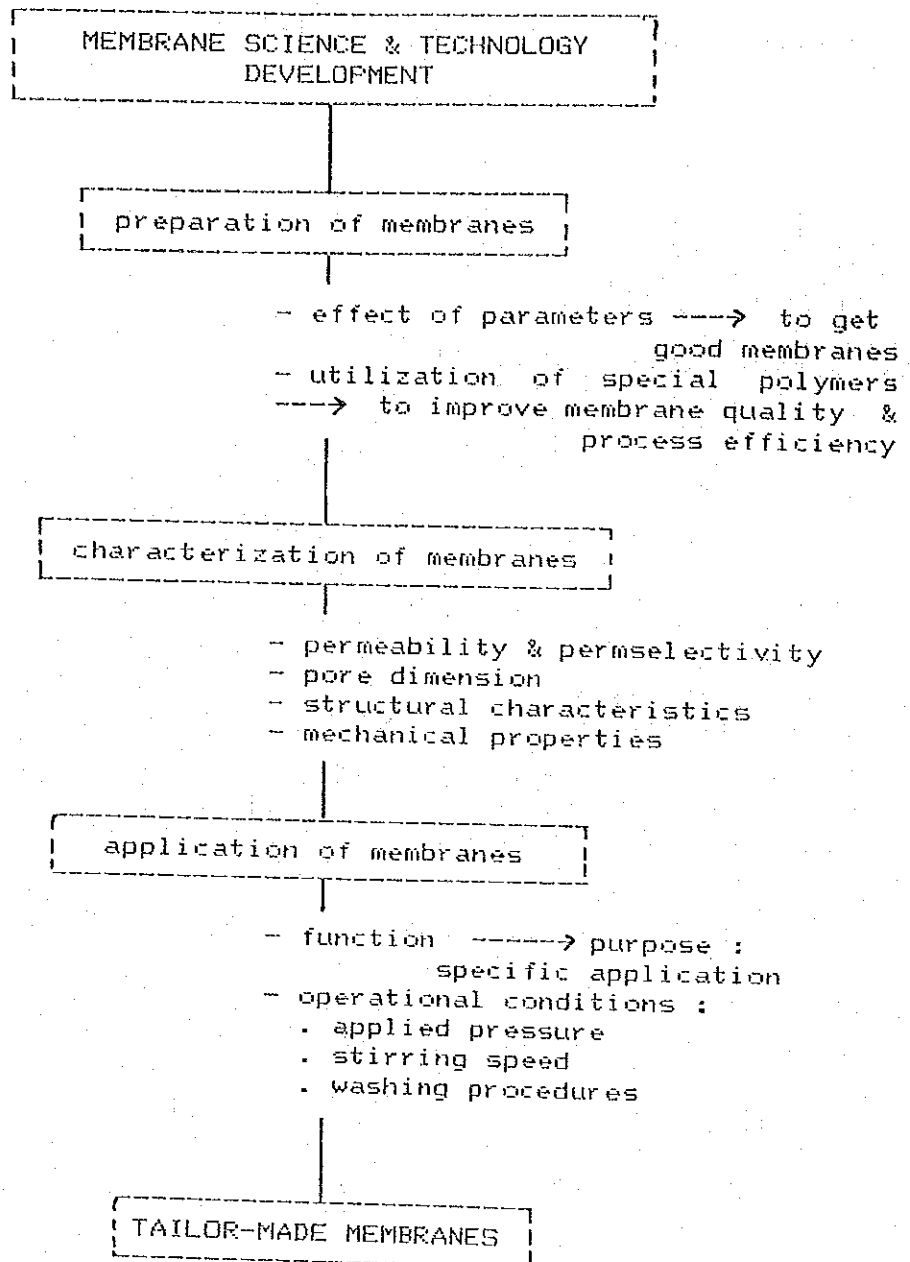
* utilization of membranes in purification, concentration or recovery processes.

Application of membranes can be classified in 3 categories :

- a. application for social-life: obtaining clean and healthy water.
- b. application for environmental preservation: overcoming pollution problems.
- c. application in certain high-technology industries.

* study of operational conditions in filtration processes :
applied pressure, stirring speed, washing procedures etc.

OVERALL SCHEME



PROGRESS REPORT 91/92

The activities realized during these first 6 months (July 1991 - December 1991) are as follows :

1. preparation of hollow fiber membranes in different conditions. Composition of the mixtures is taken constant for each preparation , i.e. 18 % polysulfone, 18 % polyethyleneglycol and 64 % N,N-dimethylacetamide.

The quality of membranes has been influenced by several parameters :

- flow of dope which is varied by changing the applied pressure
- flow of water which functions as coagulant inside the membrane
- distance between the spinnerette and external coagulant (water in the coagulation bath)

The optimal condition of the above mentioned parameters was then used for the following preparations.

2. preparation of membrane modules by using PVC housings.

Bundles of hollow fibers which contained about 1500 - 1800 fibers were put into PVC pipes of certain lengths. By using araldite adhesives, both ends of fibers were fixed to the pipe. The technique of fixing the adhesives were gradually ameliorated.

3. set up (assembling) of equipments for the clarification of turbid water.

Water pump, membrane module , manometer , tubings and other small accessories were set together. Prefilters were set before the membrane module to retain the large particles.

4. characterization of membranes :

Water flux and rejection coefficient towards dextran solutions were determined. We can obtain water flux in the range of 600 L/h .

DONATED EQUIPMENTS :

<u>Type of equipment</u>	<u>Amount</u>	<u>Results of utilization</u>
1. Electromotor DC var. speed, 1/4 PK	1 unit	regulate the speed of winder
2. Manometer 0-4 atm	1 unit	measure the pressure in HF module
3. Manometer 0-1- atm	1 unit	measure the pressure in HF module
4. Erlenmeyer 1000 mL	6 unit	prepare the dope (mixture solution)
5. Flowmeter kit	1 unit	measure the water flow during HF preparation
6. Water pump DAB	1 unit	proceed the filtration process
7. Water pump National	1 unit	proceed the filtration process
8. Water meter 1/2 "	1 unit	measure the water flow
9. PVC welding machine	1 unit	weld PVC pipes
10. PVC housings	20 unit	make HF modules
11. Water purifier Aqua-science	1 unit	test the RO membranes
12. High pressure pump	1 unit	proceed the RO process

FURTHER RESEARCH PLAN

Until the end of the project (September 1st, 1992) we plan to accomplish these research programmes :

1. continue other characterizations such as determination of pore

diameters by Scanning Electron Microscope, testing of tensile strength and MW determination.

2. clarification of turbid water
 - considering the varied applied pressure
 - observing the membrane performance as a function of time
3. analyzing the result of clarification
 - analyzing the content of certain chemicals: Fe, Mn, Zn ions
 - turbidity measurements
4. data processing
5. report preparation

IMPLEMENTATION SCHEDULE

Type of activity	month 1992							
	1	2	3	4	5	6	7	8
1. characterization	xxxxxxx							
2. clarification of turbid water	xxxxxxxxxxxxxxxx							
3. analyzing the result of clarification		xxxxxxxxxxxxxxxx						
4. data processing					xxxxxxxxx			
5. report preparation							xxxxxx	

PROPOSALS FOR JAPANESE SIDE

DESPATCH OF C/P TRAINEES

We propose that one of the staff could be sent to Japan to improve the knowledge and technical know-how in the field of membrane.

Name of candidate : Dr. Cynthia L. Radiman

Field of interest : Membrane technology

Proposed period : 1st June - 31st October 1992

ASEAN - Japan Cooperation
on Materials science and Technology
Indonesia Project-Characterization on Polymeric Materials
Progress report August 1990 - December 1991

- I. Institution : Institute for R&D of Cellulose Industries
- II. Sub. Project title : Characterization of polymeric materials in Prehydrolyzed sulphate pulping of *Pinus merkusii*
- III. Activities

1. Characterization of hemicellulose

Preparation of hemicellulose samples isolated from *Pinus merkusii* raw material and prehydrolysed chips for DSC determination

2. Utilization of lignin isolated from black liquor as adhesives substance.

Isolation of lignin from Black liquor were carried out. The optimum condition for the isolation were determined. The characterization of lignin produced were measured by DSC and IR Spectrophotometer. The lignin produced was used as an adhesive substance in particle board making. Various pressing temperature and various quantity of lignin were used in the experiment to obtain the optimum condition. Strength properties of the board obtained such as modulus of rupture, tensile strength, screw picked up were measured

3. Reactivity of cellulose toward NaOH for never dried and oven dried pulp.

Samples of *Pinus merkusii* and *Eucalyptus urophylla* were soaked with NaOH solution for one hour, dried and rewetted with NaOH solution. Drying was conducted at room temperature, 60^o C and 100^o C. Sample preparation for DSC determination was done



THE INSTITUTE FOR RESEARCH AND DEVELOPMENT OF TEXTILE INDUSTRIES

JALAN JENDRAL A. YANI 390 - TELP. (022) 71214/71215 FAX. : 022 - 71288 BANDUNG - 40272, INDONESIA

PROGRESS REPORT

1. TITLE : CHARACTERIZATION OF MODIFIED POLYESTER, VISCOSE RAYON,
AND TEXTILE RESIN FINISHED.

2. INSTITUTION :

INSTITUTE FOR RESEARCH AND DEVELOPMENT OF TEXTILE
INDUSTRIES

3. SCOPE OF PROJECT :

- Preliminary study on the manufacture of modified polyester, viscose rayon, and textile resin finished.
- Fundamental study on the changes of polymer characteristics of modified and unmodified textile fibres and resin finishes.

4. RESULTS : for the fiscal year August 1990 - March 1992

a. CHARACTERIZATION OF PET-POY AND FOY AFTER BEING TREATED HEATSETTING
AND CAUSTIZATION PROCESS

(by: Isminingsih G. and Susyami Hitariat)

Polyester PET-POY (partially oriented yarn) and PET-FOY (fully oriented yarn) have been subjected to two different order of processes, namely heatsetting followed by caustization and its reversed process (caustization followed by heatsetting). The heatsetting for the both process orders were carried out at the temperature ranges of 140°C - 210°C for 60 seconds, while caustization process was done in the 25% of NaOH solution at 110°C for 50 minutes.

The treated PET-POY and PET-FOY with caustization and heatsetting process, respectively, or combination of the two processes, obtained different effect in mechanical, physical and chemical properties, resulted to different strength, modulus elasticity, crystallinity and dyeability.

b. CHARACTERIZATION OF CELLULOSE RAYON FABRICS AFTER BEING TREATED
WITH FLAME PROOF FINISHING PROCESS BY USING RESIN CONTAINING
FLUOR COMPOUND

(by: Nyoto Wibowo)

Viscose rayon fabrics were subjected to flame proof finishing process by using resin containing fluor compound (Protenyl BSP 3105 S) with the process order of pad-dry-cure and variation of phosphoric acid and curing process.

The optimum condition was obtained by using Protenyl BSP 3105 300 g/l and 10 g/l phosphoric acid at the curing temperature of 110°C for 60 seconds.

The treated sample obtained low enthalpy of melting (223.2 mj/mg) with melting point at 248.3 °C. The flamibility test exhibited total burnt with burning time 10.42 seconds in the warp direction and 10.95 seconds in the filling direction.



THE INSTITUTE FOR RESEARCH AND DEVELOPMENT OF TEXTILE INDUSTRIES

JALAN JENDRAL A. YANI 390 - TELP. (022) 71214/71215 FAX. : 022 - 71288 BANDUNG - 40272, INDONESIA

- c. THE DYABILITY OF MODIFIED PET FABRICS WITH VARIOUS ALKYLAMINES TO THE ANION-ACID DYES AND NONION-DISPERSED DYES WITH SIMILAR DYE STRUCTURES

(by : Isminingsih Gitopadmojo)

Poly(ethylene terephthalate) fabric was subjected to various alkylamines, namely tetraethylene pentamine (TTEPA), pentaethylene hezamine (PTEHA), polyethylene glycol diamine (PEGDA) and polyethylene imine (PEI). The first experiment involved aminolysis treatment with concentrated TTEPA and PTEHA at 85°C for various time of treatment from 30 minutes up to 5 hours. The second experiment was the same treatment with TTEPA, PTEHA, PEGDA, and PEI, respectively, with various concentrations from 0 mole/l up to 0.5 mole/l, at 130°C for 2 hours.

The first and second treatments exhibited good dyeability to anion-acid dye (C.I. ACID BLUE 25) as well as to nonion-dispersed dye (C.I. DIDPERSE BLUE 3), with higher dyability to acid dye than to disperse dye. The dyeability to acid dye with higher K/S value were obtained by the order of PET treated with PTEHA, TTEPA, PEGDA, and PEI, respectively.

It was noted that the increase in treatment times and amine concentrations will tend to increase the moisture regain, yellowness, the dyability to acid and disperse dyes, with the decrease in fibre weight, strength and elongation.

The polymer characterization by means of GPC, FTIR, TA, XRD and SEM were still in progress.

- d. CHARACTERIZATION OF POLYESTER FIBER AFTER BEING EXPOSED TO TROPICAL SUNLIGHT

(by: Zubaidi)

The PET fabrics were exposed to tropical sunlight for various times from 1 up to 25 hours. The treated fabrics were then evaluated for their strength, elongation, molecular weight and thermal analysis. The experimental activities was still in progress.

- e. Special Project : UTILIZATION OF CM-WOOD IN TEXTILE PRINTING

(By: Zubaidi, et.al.)

Utilization of CM-Wood in textile printing were carried out by comparing various product of CM-wood with different code names such as RYRS, RYR, PB1, PB13 and other commercial thickener such as CMC, alginates, processed gum, etc.

The activities has covered the preparation of CM-wood for thickener, measurement of viscosity and the stability of thickeners, miscibility and compatibility with dyes and auxiliaries, printing process on cotton fabrics with reactive dye, removal properties of thickener from cotton fabric after printing process, etc.

Printing process and evaluation were still in progress.



THE INSTITUTE FOR RESEARCH AND DEVELOPMENT OF TEXTILE INDUSTRIES

JALAN JENDRAL A. YANI 390 - TELP. (022) 71214/71215 FAX. : 022- 71288 BANDUNG - 40272, INDONESIA

f. Collaborative Research:

CHEMICAL MODIFICATION OF SILK FIBERS BY DIMETHYLDIHYDROXY ETHYLENE UREA (DMDHEU) AND POLYSILOXANE

(By: Kuntari Sasas from IRDTI, Indonesia, and
Sireerat Charuchinda from TIDDIP, Thailand)

The chemical modification of silk fibers were carried out using dimethyldihydroxyethylene urea (DMDHEU) and polysiloxane, respectively, with the process order of padding-drying-curing-scouring. The resin concentrations were varied from 20g/l up to 100 g/l, with the catalyst for DMDHEU was $MgCl_2 \cdot 6H_2O$ varied from 10g/l - 20 g/l and the catalyst for polysiloxane was acetic acid 60% varied for the pH4 - pH6. After padding in the resin solution with 70% wet pick up, the treated samples were dried at 100°C for 2 minutes, and then cured at 140°C for 4 minutes. The samples were then scoured in neutral soap and rinsed well.

The increasing concentration of resins up to 80 g/l, tend to increase the wrinkle resistance, smooth appearance, strength and the rigidity of the silk fabrics. However, compared to the untreated silk, the treated silks have become stiffer and start to loose its soft handling with small decrease in fabric strength.

Characterization by means of thermal analysis, FTIR, XRD and SEM, did not show many changes in thermal properties, and crystallinity, regardless of any treatment, except some additional in functional group shown by silicone compound and some granules on the surface appearances in morphology analysis.

5. Research Activities Program For Fiscal Year April 1992 - September 1992

- a. Sub Project : Characterization of modified and unmodified polyethylene terephthalate (PET) fibres, Cellulose rayon fibres and resin finishes.
- b. Expected output : Some explanations of the changes in PET, cellulose rayon, and resin finish characters due to the various processes from raw materials up to a certain product.
- c. Description of research topics :
 1. Characterization of cellulose rayon fabrics after being treated with flame proof finishing process
 2. Various modification in producing cationic and anionic dyeable poly(ethylene terephthalate) fibres and their characterization.
 3. Utilization of CM-wood in textile printing.

5. プロジェクト側作成調査書

INFORMATION ON PROJECT
THE CHARACTERIZATION OF POLYMERIC MATERIALS

DECEMBER 1991

1. Evaluation of the Project :

The objective of the project is to strengthen the technological basis for the characterization of polymeric materials in ASEAN & particularly in Indonesia (Annex I, master plan).

Evaluation, in the context of the objective of the project, the implementation has indeed toward promoting the technological basis in the area of characterization of polymeric materials. This is indicated through provision of equipment, exchange of personnel, seminar & workshop on characterization of polymeric materials (local & ASEAN) and its increasing the capabilities of personnels and improving the research result's quality. The more achievement is related to more intensive communication among scientist in this field.

However, apart of the good results mentioned above, Indonesian side observes some of equipment is still under utilized and some personnel's capability is still has to be improved. These have to be carefully planned for the future.

In general, the project is going in the right direction as expected by the objective of the project.

2. BUDGETARY REPORT (INDONESIA)

Government of Indonesia, in the context of the Project on Characterization of Polymeric Materials has provided budget allocation as counterpart fund through Development Budget received each year since 1988/1989 fiscal year. The budget items included are : Honoraria, expendables, non expendables, travel, construction, and miscellaneous. They are the following;

FY 1988/1989 - Rp 25.000.000,-
 FY 1989/1990 - Rp 75.000.000,-
 FY 1990/1991 - Rp 220.000.000,-
 FY 1991/1992 - Rp 319.350.000,-

Most of the Budget allocation was spent completely each year.

3. THE LIST OF RESEARCHER & MACHINE OPERATORS

1988	1989	1990	1991
1. Dr. W.S. Subowo	idem 1988	idem 1989	idem 1990
2. Mrs. S. Pujiastuti	plus	plus	plus
3. Djimat Lisnawati	1. Kartini I	1. Sunit Hendrana	1. Sudirman
4. Ipit Karyaningsih	2. Pramono Nugroho	2. Aries Sudarisman	minus
5. Lucia Indrarti	3. Rachmat Satoto	3. Herlan Abbas	1. Kartini Ismiati
	4. Mandiri	4. Dedi Rohendi	2. Aries Sudarisman
	5. Arianto Abdurachman	5. Dr. Nilyardi K.	
	6. Myrtha Karina	6. Nenen Rusnaeni	
	7. Hans K. Sudjono		
5 persons	12 persons	18 persons	17 persons

Donate Equipment	Responsible	Operator
01. Thermal Analyzer	Lucia Indrarti	Lucia Indrarti
02. FTIR	Pujiastuti	
03. XRD	Rachmat S/Nenen R/Hans K. Sudjono	Rachmat Satoto Hans K. Sudjono
04. Tensile TM	Rachmat Satoto	Rachmat Satoto
05. Creep Tester	Rachmat Satoto	Rachmat Satoto
06. GPC	Sunit Hendrana	Sunit Hendrana
07. Wheathering Tester	Arianto Abdurachman	Arianto Abdurachman
08. VE	Nenen R/Kreshna	Nenen Rusnaeni
09. Flow-meter	Sunit Hendrana	Sunit Hendrana
10. Test Extruder	Mundiri	Mundiri/Herlan/Dedi
11. Injection Moulding		
12. Impregnation apparatus	Subiyakto	Sudirman
13. SEM	Arianto A/Myrtha K	Arianto/Myrtha K
14. Chemistry Lab.	Pujiastuti	Ipit K/Djimat

For the purpose of maintenance of the equipment, to keep it running, the assigned persons are : Mr. Tun, AS and Mr. Arianto Abdurachman.

4. MANAGEMENT OF DONATED EQUIPMENT

A. Within P3FT

At most the equipment was used for the project purposes, and the users are mostly personnels included in the project personnels. Only in rare occasion the equipment is used for other purposes. Project personnels at any time can use the equipment. Persons already officially attached to the equipment run the machine.

B. Other Sub-Project

For the members of Sub-project, they are free to use the equipment (as for as the works related to project) however for lecturer of the university we accept one student for the Thesis each time for each member of the project & P3FT assist in machine operation. (non expendables is included as services if the stock for that purposes are available at the storage of P3FT. The stock is the donation by JICA).

C. Non Members

We consider it case by case, and this is negotiated with JICA Team at P3FT. For non member basically there is no objection for utilization of equipment, but of course this is put as second priorities.

BUDGET (Rp)

1990/1991 :

1. Honoraria	5.040.000,-	Honoraria :	11.616.000,-
2. Expendables	1.173.000,-		30.089.000,-
3. Non Expendables	104.981.500,-		9.921.000,-
4. Travel	3.396.000,-		5.062.000,-
5. Construction	24.500.000,-		9.750.000,-
6. Miscellaneous	10.909.000,-		3.562.000,-
	-----		-----
	150.000.000,-		70.000.000,-

<u>1991/1992</u> : (1)	8.349.000,-		11.605.000,-
(2)	7.250.000,-		24.000.000,-
(3)	160.000.000,-		45.000.000,-
(4)	8.462.000,-		6.254.000,-
(5)	25.000.000,-		4.000.000,-
(6)	16.000.000,-		3.500.000,-
	-----		-----
	225.000.000,-		94.350.000,-

6. プロジェクト側作成改善案

FUTURE IMPROVEMENT

I. PROJECT MANAGEMENT

- Improvement have been made to conduct Project Management once in two months. This can be used as a forum to resolve the differences if members thought some problems occurs.
- In the arrangement of utilization of the equipment the focal point will take the necessary approach to the sub-project members and will discuss on the best terms of utilization of the equipment. This have been done recently, however further discussion is needed to detail it so that it will be operational.
- To intensity the use of the equipment, we are planning to have cooperation with non member (in addition to members) to have joint research activities. We are planning to invite S2 or S3 candidate to work with us.
- For some equipment which are still not used frequently (due to lack of expertise within the project), the project will find expertise in Indonesia for training of project personels.
- For the purpose of Maintenance of Equipment, LIPI will provide fund through Development fund of GOI, beyond September 1992.
- To set up criteria to be fulfilled by the end of the project in order to be classified of successfull completion

of the project in September 1992.

- In terms of number of personels of the focal point, LIPI will provide allocation for placement of additional personnels. Therefore LIPI is still in opinion of the usefulness of centralized facilities for Polymers Research, and having good cooperation internally and with Japan.

II. OTHER MATTERS

In regards of dispatch of JICA experts, provision of equipment, supplementary budget, collaboration among institution and dispatch of trainees to Japan, it is minor improvement should be done and we insist both side can communicate frequently and regularly.

7. プロジェクト側作成機材利用状況

4c. Utilization of donated equipment in every year

1. SEM JEOL T330

1990 :

DATE	OPERATOR/USER	INSTITUTION	ACTIVITY/SAMPLE
<u>1990</u>			
July-August	Arianto and Pramono	P3FT	adjustment
21-24 August	Pramono, Kartini and Satoto	P3FT	research/blending EPM & Nylon
3-6 Sep.	Arianto, Kartini and trainees (PERTAMINA, BRIEC, Ki-TTB, TK-TTB, ITS, Gajah Mada, BES, BBT, UI)	P3FT	Training/Carbon, Catalyst before and after used
5 Sep.	Kartini&Arianto	P3FT	investigation/vulcanized rubber and fiber
13-17 Sep.	Kartini & Aris	P3FT	investigation/Nylon 6 & Tafmer
25-28 Sep.	Kartini & Arianto	P3FT	warming up routine
2-3 Oct.	Kartini & Arianto	P3FT	warming up routine and preparation for video shooting/insect (fly and out)
4-6 Oct.	Kartini and Team JICA, Video Crue	P3FT	Video shooting
3 Dec.	Emmy H.	BBT	FOY-PET
8 Dec.	Emmy H.	BBT	FOY-PET and FOY-PET
4 Dec.	Kartini	P3FT	Nylon 6 + Tafmer Nylon + EPM
24 Dec.	Emmy H	BBT	PET-FOY II PET-FOY I PET-FOY II PET-FOY K

DATE	OPERATOR/USER	INSTITUTION	ACTIVITY/SAMPLE
8-10 Oct.	Kartini-Arianto	P3FT-LIPI	Warming up, routine experiment
11 Oct.	Kartini/Holia	P3FT-LIPI	Carbon active, rice husk
23-30 Oct.	Kartini/Aris	P3FT-LIPI	Charcoal experiment/ Blending Nylon 6 & Tafmer
1-8 Nov.	Kartini	P3FT-LIPI	Warming up : Preparation to training
9 Nov.	Kartini and trainees (BAT, P3FT, BBS, P3KT, IPIN, ASTRA, BBT, Ki/Fi/Tk-ITB, UGM, BRIEC, UI, BATAN, PERTAMINA, ITS)	P3FT-LIPI	Training/EPM, Tafmer, nylon + tafmer, nylon + EPM
14 Nov.	Kartini and Aris	P3FT	Cleaning & adjustment
16 Nov.	Kartini & trainees	P3FT and others (see 9 Nov.)	Training/Nylon 6, tafmer, Nylon 6 + tafmer, EPM, Nylon 6 + EPM
26/11-90	Emmy	BBT	Investigation/PET-FOY
28/11-90	Emmy	BBT	PET-FOY (alkali hydrolyzed)
27 Dec.	Zubaidi, Emmy H Kartini	BBT BBT P3FT	Polyester Staple S1 S2 S3 S4 FOY, PB 8 FOY: B1N, B2N, B1, Texture
28 Dec.	Emmy H Kertini	BBT P3FT	PET
<u>1991</u>			
2 Jan.	Zubaidi	BBT	PET-fiber
10 Jan.	Kartini	P3FT	PVC, Nylon 6, N-Tafmer
14 Jan.	Kartini	P3FT	PVC
15 Jan.	Emmy	BBT	PET-FOY PET-FOY
16 Jan.	Arianto	P3FT	Filament cleaning

DATE	OPERATOR/USER	INSTITUTION	ACTIVITY/SAMPLE
17 Jan.	Kartini/ Holia	P3FT (UNDP)	charcoal
17 Jan.	Emy	BBT	PET-FOY PET-FOY
31 Jan	Kartini/ Dr. Fajar H, Ratna	P3FT Ki-ITB	hollow fiber
1 Febr.	Kartini/Ratna	P3FT/Ki-ITB	hollow fiber
2/2	Kartini/ Elinor, Nuri	P3FT/ Collab partici- pant : Phil/P3KT	blending PP and PEM etched by Xylene
5/2	Kartini/Aris Nuri	P3FT P3KT	PP & PEM-blending with various ratio, PEM
8/2	Kartini	P3FT	Filament cleaning
15/2	Kartini	P3FT	hollow fiber
18/2	Kartini	P3FT	allignment
19/2	Kartini	P3FT	allignment
21 Feb.	Nur Danajaya	Fi-ITB	poli-3 methyl tiophene 1. BF4 doped 2. BF4 undoped 3. CF3SO3 doped 4. CF3SO3 undoped 5. ClO4 doped 6. ClO4 undoped 7. PF6 doped 8. PF6 undoped
19 March	Kartini and Dr. M. Kyotani (sample from WS)	P3FT RIPT	GMC-film OM-RW-film/cross section
20/3	Kartini and Dr. M. Kyotani	P3FT RIPT	exercise
21-22/3	Dr. M. Kyotani	RIPT	embedded in epoxy resin
26/3	Kartini/Lucia	P3FT	Wood-Albizia, Pinus, Teak

DATE	OPERATOR/USER	INSTITUTION	ACTIVITY/SAMPLE
1/4	Kartini, Myrtha, Hartati	P3FT P3M	exercise
23/4	Arianto and Myrtha/PERTAMINA	P3FT	unknown
5 June	Arianto and Myrtha/for PERTAMINA	P3FT PERTAMINA	unknown sample
6 June	Arianto	P3FT	Changed filament
10 June	Arianto/for Mech. Eng-ITB	P3FT ITB	metal
14 June	Mech. Eng-ITB	ITB	metal
17 June	Arianto/for P3FT Serpong	P3FT	In & Sn (conducting layer)
16 July	Arianto/ Wundari	P3FT ITB	Blend PEP + PC
14 Nov.	Arianto/ Kuntari and Sireerat	P3FT/BST Collaborative research	Silk yarn
15 Nov.	Sireerat	Collaborative research	Silk fabrics
19 Nov.	Arianto/Marissa	P3FT/Collab. Res.	Nata de coco
20 Nov.	Arianto/Marissa	P3FT/Collab. Res.	Nata de coco
25 Nov.	Arianto/Marissa	P3FT/Collab. Res.	Nata de coco

Weathering Tester

Institution	1990		1991	
	Utilization	Sample	Utilization	Sample
P3FT-LIPI	(Start from October) 10 x	PVC, PS, PP, PVAC	27 x Including adjustment and preparation for training and exercise	PVC, plant tissue PP
P3KT-LIPI	nil	-	nil	-
KI - ITB	nil	-	nil	-
FI - ITB	nil	-	nil	-
BBT	nil	-	nil	-
BBS	nil	-	nil	-
Others	nil	-	nil	-

Creep Tester

Institution	1990		1991	
	Utilization	Sample	Utilization	Sample
P3FT-LIPI	32x	PE, OHP	nil	-
P3KT-LIPI	nil	-	nil	-
KI - ITB	nil	-	nil	-
FI - ITB	nil	-	nil	-
TK - ITB	nil	-	nil	-
BBT	nil	-	nil	-
BBS	nil	-	nil	-
Others	nil	-	nil	-

Moulding Machine

Institution	1991	
	Utilization	Sample
P3FT-LIPI	28x Including exercise, trial run and training	PP, PS blending PP-EPM
P3KT-LIPI	nil	-
KI - ITB	nil	-
FI - ITB	nil	-
TK - ITB	nil	-
BBT	nil	-
BBS	nil	-
Others	nil	-

Tensile Tester

Institution	1990		1991	
	Utilization	Sample	Utilization	Sample
P3FT-LIPI	29 x including training ASEAN Local training and exercise	HDPE, PT, PVC, EPM- nylon, tafmer LDPE	15 x Including exercise	PP, PP + EPM, PVC, Cu-CMC Cell-Ac
P3KT-LIPI	nil	-	1 x	adhesive
KI - IYB	6 x	-	4 x	PP
FI - IYB	nil	-	nil	-
TK - IYB	nil	-	nil	-
B8T	nil	-	nil	-
B8S	nil	-	nil	-
Others	nil	-	nil	-
Polygon Mas,PTI	2 x	Wood adhesive	-	-

CAPYROGRAPH

Institution	1990		1991	
	Utilization	Sample	Utilization	Sample
P3FT-LIPI	19 x	LDPE, HDPE, PVC PS	7 x	PP
	1 x training		1 x collab research	PVC
P3KT-LIPI	—		—	
KI - IT8	—		—	
FI - IT8	—		—	
TK - IT8	—		—	
BOT	—		—	
BBS	—		—	

Test Extruder

Institution	1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FT-LIPI	23 x	Polymer LDPE, PVC PP, nylon PS	37 x 1 x collab research	HOPE, PVC, LDDE PE, PC/ABS, nylon, EPM, PP, EPM, PVC PVC	16 x	PP, EPM
P3KT-LIPI	—	—	—	—	—	—
KI - IT8	—	—	5 x	PE, LDPE, HOPE	9 x	PET + PC
FI - IT8	—	—	—	—	—	—
TK - IT8	—	—	8 x	PVC, PS	—	—
B8T	—	—	—	—	—	—
B8S	—	—	—	—	—	—
another inst :	—	—	—	—	—	—
BATAN	—	—	1 x	Thermoplastic elastomer	—	—
UNPAD	—	—	—	—	10 x	PE + Urea, Maizena (Starch)

GPC

Institution	1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FI-LIPI	7 x	PS PVC	41 x	PEG, PS, PVC	18 x 1 x collab research	PP PVC
P3KI-LIPI			1 x	adhesive	1 x training (multilateral) 1 x training GPC	PP
KI - ITB						
FI - ITB						
TK - ITB						
BBI						
BBS						
						Maizena

X-RD

Institution	1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FT-LIPI	38 x	Ceramics Polymer	56 x	Polymer Ceramic Superconductor Carbon, Si	18 x	Polymer Ceramic Superconductor Sekam
P3KT-LIPI	1 x training	Polypropylene	—	—	—	—
KI - ITB	12 x	PET	—	—	2 x	IC + PET
FI - ITB	—	—	—	—	—	—
TK - ITB	—	—	—	—	—	—
BBT	1 x	PET	1 x	PET	12 x	PET + PP
BBS	—	—	—	—	—	—
Other institution	—	—	26 x	Cellulose	2 x	cellulose
BATAN	1 x	Fe	—	—	—	Maizena

VISCOELASTOMER

Institution	1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FT-LIPI	15 x	adhesive PE, PS, PET, PVDF	10 x	HDPE, PET, Nb Tafner, OHP film PC	13 x	PP, EPM, Si rubber, PP, PE, PET
P3ET-LIPI	2 x training	PETP, PVDF	Training 2 x	PET	Training 2 x	PET
XI - ITB	nil	-	nil	-	nil	-
F1 - ITB	1 x	PET, PVDF	nil	-	nil	-
T8 - ITB	nil	-	nil	-	-	-
B8T	nil	-	nil	-	17 X	PET + PP
BBS	nil	-	nil	-	-	-

FTIR

Institution	1988		1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FT-LIPI	13 x	Siloxan CMC karbon grafit PP cellulose acetate silica gell	26 x 1 x training	kapas, pulp, CMC, PVC, PS, PE, HDPE, LDPE	36 x 1 x training	Food box Hemi cellulose cup drink spoon, HDPE, CM wood battery case PP, Pulp+NaOH CMC	48 x 2 x training	CM wood PP + EPM Poly- urethan HDPE LDPE PP PE Karet
P3KT-LIPI	-		2 x training	PS/Polymethyl methacrylate	3 x training	adhesive	-	
KI - ITB	-		2 x training	Polysulfon	1 x training	Polysulfon	-	
FI - ITB	-		2 x training	Karbon tipis	4 x training	Film	-	
TK - ITB	1 x training	Karet	-		1 x training	Karet		
88I	1 x training	Textile	5 x training	PET/FOY -	5 x training	PET		
88S	1 x training	Lignin			3 x training	Pulp, BBPM, Lignin		

THERMAL ANALYSIS SYSTEM

Institution	1988		1989		1990		1991	
	Utilization	Sample	Utilization	Sample	Utilization	Sample	Utilization	Sample
P3FT-LIP1	16 y	cellulose, acetate, ceranic, PP; cellulose oligooryacethylene ether	38 y	PP, PVC, CXC, Pulp, CDHAP, PS Isocyanate, RICE HUSK, PE, Cell VI	39 y	LDPE, HDPE, PS Food box, cassette box, cup, drink, spoon, super conductor, rubber, battery case, PVC, nylon, EPK+PET; EPK + nylon, HBS; tafner+NS; PET Master bach	25 y	PP, CXC, LDPE, PVC; rice husk;
	nil	-	training 7 y	PET, PP, rubber, PS, PVC, PEKN, IO, FOY, cell VI;	training 2 y	NS + tafner	training 5 y	PP, PET
	nil	-	nil	-	collaborative; research 4 y	PP + EPK	collaborative; research 26y	PP+EPK, PVC compound, silk polysi loxane
P3XT	6 y	HDPE; PS + PKMA	19 y	LDPE; PS; PKMA, PS + PKMA, Plexy; glass; rubber	nil	-	nil	-
KI - ITB	1 y	Poly-sulfan	6 y	Polysulfan, HDPE, LDPE	15 y	Polysulfan; cable, PE	nil	-
FI - ITB	nil	Poly-sulfon	6 y	Polysulfon, HDPE, LDPE	15 y	Polysulfon, cable, PE	nil	-
TK - ITB	nil	-	2 y	nylon 6	nil	-	nil	-
BBT	1 y	PET	5 y	PET, PEAS	16 y	PP, PET	18 y	OHP, PET, BY-POC, PP;
BBS	1 y	Lignin	8 y	Benisel, cellulose; pulp	8 y	pulp, heai cellulose, lignin H ₂ O	9 y	Lignin, avicel, pulp, heai cellulose;
Others:								
UNAIR	nil	-	3 y	bahan farmasi	2 y	bahan farmasi		
P3BOGOR	nil	-	nil	-	2 y	rubber		
B4T	nil	-	nil	-	nil	-	1 y	HDPE, LDPE;

8. 參加機關自己評價表

1. PROJECT MANAGEMENT

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
<ul style="list-style-type: none"> - Management and Coordination of the project-implementation at the Indonesian side - Facilitating the project member to implement their plan-activities - Working together with the JICA Project Team in managing the project 	<ul style="list-style-type: none"> - Fair Achievement - Growing mis-understanding between Indonesia and JICA project management team 	<ul style="list-style-type: none"> - It is felt too much unnecessary intervention by JICA Team Leader on how the detail work should be implemented in the Indonesia side - Confusion on the role of JICA Team Leader and Coordinator 	<ul style="list-style-type: none"> - Better to stick on agreeable management interaction according to the project document with good understanding.

2. DESPATCH OF JICA EXPERTS

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
<ul style="list-style-type: none"> - To get assistance in improving research capability and utilizing the Characterization methods - To exchange information and to establish linkages with the experts 	<ul style="list-style-type: none"> - In general good - Surprise/unplanned experts were arranged by JICA Team Leader 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> - Better to avoid the invitation of JICA supported experts without discussion at the planning stage.

3. PROVISION OF EQUIPMENT BY JICA

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
<ul style="list-style-type: none"> - To establish reliable facilities for polymer characterization and research 	<ul style="list-style-type: none"> - Set up of equipments - Some equipments is still awaited 	<ul style="list-style-type: none"> - Effective use of equipments for the member of projects - Provision of expendables and spare-parts 	<ul style="list-style-type: none"> - Create understanding and commitments of sub-project members.

4 SUPPLEMENTARY BUDGET BY JICA

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
<ul style="list-style-type: none"> Financial support for conducting : <ul style="list-style-type: none"> - research - training - inter institutional activities 	<ul style="list-style-type: none"> Understand there were support but did not really been felt so effective in terms of the successful implementation of the activities 	<ul style="list-style-type: none"> - Differences in the way to interpret the administrative procedure - No clear information on the fund available to be committed 	<ul style="list-style-type: none"> - Better to plan together with clear information on the available budget.

5. COLLABORATION AND AMONG INSTITUTIONS

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
<p>To create and strengthen interaction among research group from various institutions in Indonesia and with researchers from ASEAN and Japan</p>	<ul style="list-style-type: none"> - Minimum interaction among sub-project activities and within the group of special topic research activities - Implementation of several training programmes - Implementation of collaborative research with ASEAN 	<p>Since the last one year there was a growing confusion on the role of JICA Project Team Leader in promoting the inter-team collaboration (at least among the Indonesian Institutions)</p>	<p>We should follow consistently the management flow agreement to avoid further confusion.</p>

6. DESPATCH OF TRAINEES TO JAPAN

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
<ul style="list-style-type: none"> - To improve research capability of research staff - To promote interaction with groups in Japan 	<p>Satisfactory</p>	<p>Arrangement the departure of trainees</p>	<p>More interaction in planning the programme between JICA and Indonesia Team Leaders.</p>

1. PROJECT MANAGEMENT

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
<ul style="list-style-type: none"> - To assist the management of the project - To get up-to-date and precise information on the project activities - To achieve better understanding with JICA experts between participating institutions 	Fairly good	Lately it seems that there has not been enough understanding between JICA Team and Indonesian Team.	Effort to find out the source of the problems and how to overcome them should be pursued

2. DESPATCH OF JICA EXPERTS

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
<p>The objectives of participation in the activities performed by JICA experts are :</p> <ul style="list-style-type: none"> - to strengthen our knowledge especially in characterization of polymeric materials - to increase our ability in using sophisticated equipments 	Good	Complete mastering of sophisticated equipments cannot be achieved in a relatively short time	Further chances of using the equipments should be provided

3. PROVISION OF EQUIPMENT BY JICA

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
To strengthen the ability in doing research on polymeric science	Satisfactory	Sometimes the equipments are not in good conditions for running	Further training of the persons in charge of the equipments would be beneficial

4. SUPPLEMENTARY BUDGET BY JICA

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
To strengthen the ability of participating institutions	Good	Some equipments are of rather inferior qualities	More careful examination of the equipments during tryout by the user

5. COLLABORATION AMONG AUSTRIAN INSTITUTIONS (TEAM)

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
Exchange of information among polymer research institutes	Limited	Limited opportunity to discuss a research plan	<ul style="list-style-type: none"> - Arrange colloquium more often (for local institution) - To make better communication facilities

6. DESPATCH OF TRAINEES TO JAPAN

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
<ul style="list-style-type: none"> - To gain more experience in doing research on polymer - To get acquainted with Japanese researchers - To know better about Japan 	Satisfactory	None	None

7. MULTILATERAL ACTIVITIES

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
a. Collaborative research b. Dispatch of trainees to member countries c. Business trip d. Symposium	Good	Different area of interest and activity, need non-member institution to participate, especially for training	Bilateral activity or cooperation between Japan and a group of countries having similar interest

8. OTHERS

OBJECTIVE OF PARTICIPATION	RESULT/ACHIEVEMENT	PROBLEM ARISING	SUGGESTION

JICA - JAKARTA TO F
 FAX: 326-946

1. PROJECT MANAGEMENT

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTIONS
1) Coordination of sub-project activities	1) Virtually ineffective	1) Commitment of subproject & individual institutional and lack of common interest.	Simplify management system by replacing frequent management meeting with simple but clear cut rules
2) Coordination of joint activities such as regional seminars	2) Relatively he had managed program	2) Role of subproject leaders involvement is not clearly defined.	2) "Ho game"
3) Discussion of principle matters such as overall planning, activity program, major equipment acquisitions etc.	3) Less than satisfactory in implementation	3) Basis of decision is not always well understood and implemented	
		4) Limited time available for joint management	

2. DESPATCH OF JICA EXPERTS

OBJECTIVE OF PARTICIPATION	RESULT ACHIEVEMENT	PROBLEM ARISING	SUGGESTION
Expected to be experts active in research works for the purposes of collaborative research with Indonesian partners	Mostly are experts for training in instrumental operations related with equipment installation	Lack of cooperative and collaborative research etc., or not enough follow-up of contacts made previously in Japan.	1) Indonesian subproject leaders prepare description of research plans or blueprints in order to find Japanese counterpart sharing common interest 2) Provide Indonesian partners the opportunity to find personally their partners in Japan and make necessary adjustment 3) More frequent direct cooperation between associated scientists

