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**UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANISATION**



**INTERNATIONAL CENTRE FOR
SCIENCE AND HIGH TECHNOLOGY**



**MALAYSIAN PALM OIL BOARD
(MPOB)**

FINAL REPORT

Workshop on

**“Catalytic Technologies for Sustainable Industrial
Processes Utilizing Crop-derived Renewable Raw
Materials”**

Bangi, Malaysia, 17-19 December 2002

**UNIDO PROJECT TF/GLO/00/105
CONTRACT No. : 2002/251**

OBJECTIVES

The main objectives of the proposed workshop were as follows:

- To survey the potential of developing novel catalytic materials for sustainable industrial processes utilizing renewable raw materials
- To survey the available catalytic technologies for the valorization of renewable resources
- To survey the state-of-the art in South East Asian countries
- To identify the current environmental problems of chemical industry with respect to application of catalytic processes
- To evaluate the priorities in the field of the countries from the region and formulate possible cooperative projects

ORGANIZATION

The workshop was organized jointly by the International Center for Science and High Technology (ICS), United Nations Industrial Development Organization and Malaysia Palm Oil Board, Malaysia.

The local Organizing Committee consisted of:

1. Dr. Ma Ah Ngan (Chairman)
2. Dr. Cheah Kien Yoo (Secretary)
3. Ms. Judy Oong
4. Mr. Hussin Salleh

DATES AND VENUE

The workshop was held on 17-19 December 2002 at Malaysia Palm Oil Board in Bangi, Malaysia.

FUNDING

The total expenditure for this project was USD 22,389.01, of which US\$ 19,395 within the budget items which were planned to be covered with UNIDO budget. However the total expected contribution from ICS-UNIDO was of US\$ 17,000, of which US\$ 13,600 were already received before the beginning of the workshop. Therefore the requested remaining funds to be received is of US\$ 3,400 and the rest of the expenses will be covered by the local organizing Institution

The Organizing Committee has arranged for tickets for all international participants and Malaysian participants living outside of Bangi, meals, accommodation at hotels, etc., with reasonable costs and quality. A summary of the final budget is given in Appendix 1.

SCIENTIFIC PROGRAM

15 keynote lectures and 6 country reports were presented during the workshop. The detailed workshop program is given in Appendix 2.

The key topics covered during the workshop were:

- A. Renewable raw materials for fine chemical synthesis
- B. Sustainable catalytic technologies for the conversion of renewables
- C. Environmentally benign technologies
- D. Fuels and energy from renewables.
- E. Heterogeneous catalysis for fine chemicals production
- F. Country reports

PARTICIPATION

A total of 70 participants took part in the workshop. Participants' affiliations included universities (28.6 %), R&D institutions (45.7 %) and industry (25.7 %). Distribution of the participants according to countries is shown in Table 1.

Table 1. Participants according to countries

No.	COUNTRY	NUMBER OF PARTICIPANTS
1	France	1
2	Indonesia	1
3	Italy	3
4	Japan	2
5	The Philippines	2
6	Singapore	2
7	Thailand	1
8	Vietnam	1
9	Malaysia	57

List of lecturers and speakers from different countries are given in Tables 2 and 3, respectively. The complete lists of participants and lecturers are attached (Appendix 3).

Table 2. List of lecturers of the workshop

No.	LECTURER	INSTITUTION	COUNTRY
1	Mario G. Clerici	Eni Technologie , Milan	Italy
2	Ma Ah Ngan	Malaysian Palm Oil Board	Malaysia
3	Salmiah Ahmad	Malaysian Palm Oil Board	Malaysia
4	Hisashi Sasamoto	Lion Corporation	Japan
5	P. Gallezot	Institut de Recherche sur la Catalyse	France
6	Fujio Mizukami	National Institute of Advanced Industrial Science and Technology	Japan
7	F. Trifiro	University of Bologna, Bologna	Italy
8	Liew Kong Yong	University Science of Malaysia	Malaysia
9	Choo Yuen May	Malaysian Palm Oil Board	Malaysia
10	Paolo Fornasiero	University of Trieste	Italy
11	Chan Siew Hwa	Nanyang Technological University	Singapore
12	Nicholas B.H. Lim	Control System Integrator Sdn. Bhd.	Malaysia

Table 3. List of country report presenters

No.	SPEAKER	INSTITUTION	COUNTRY
1	Natividad Mendosa	Industrial Technology Development Institute	The Pilippines
2	Huynh Phu	Centre of Technology Transfer and Environment	Vietnam
3	Setijo Bismo	Universitas Indonesia	Indonesia
4	Sharifah Bee Abd. Hamid	University of Malaya	Malaysia
5	Tharathon Mongkhonsi	Chulalongkorn University	Thailand
6	David Liang Tee	Nanyang Technological University	Singapore

WORKSHOP MATERIALS

Each participant and lecturer was provided with a workshop bag containing the following:

- Abstracts and handouts of lectures and country reports
- Detailed workshop program
- List of participants with their mailing addresses
- Pen and notebook
- Identification badge

OPENING CEREMONY

The Opening Ceremony of the workshop was organized at the Conference Hall of Malaysian Palm Oil Board. The function was declared open by Deputy Director General of MPOB.

SOCIAL EVENTS

Lunches and a workshop dinner were organized for all participants of the workshop. A field trip to oil palm plantation and palm oil mill was organized for all interested participants.

ASSESSMENT

Assessment of the workshop was performed by an optional questionnaire to all participants. A summary of this assessment is given in Table 4. According to the result of this assessment the workshop was very successful and the organization was very good, most evaluations have been from very good to excellent.

All participants would recommend others to attend a similar workshop.

Table 4. Summary of the questionnaire (%) based on 23 participants

A. Organization

Item	Excellent	Very good	Good	Fair	No answer
2. Information process	26.1	56.5	17.4	-	-
3. Announcement and pre-course material	26.1	30.4	43.5	-	-
4. Scientific program	34.8	56.5	8.7	-	-
4.1 Applied lecture/workshop	21.7	60.9	17.4	-	-
4.3 Case studies	13.0	56.5	17.5	-	13.0
4.4 Time spent by lecturers in class and after class on specific questions	13.0	56.5	13.0	-	17.5

Item	Balanced	Unbalanced	No answer
4.5 students scientific knowledge	73.9	-	26.1

B. Duration of Program

Item	Just right	Too long	Too short	No answer
1. Number of days	100	-	-	-
2. Length of working days	100	-	-	-

C. Training facilities & hotel

Item	Excellent	Very good	Good	Fair	N.A
1. Lecture/Training rooms	39.1	39.1	21.8	-	-
2. Breaks/refreshments	30.4	47.8	21.8	-	-
3. Hotel accommodation	58.3	25.0	16.7	-	-
4. Meals at the hotel	38.5	38.5	23.0	-	-

D. Organizer's response

Excellent	Very good	Good	Fair	No answer
26.1	56.5	17.4	-	-

E. Overall program organization

Excellent	Very good	Good	Fair	No answer
26.1	60.9	13.0	-	-

F. Would you recommend to others to attend a similar activity in the future?

Yes	Maybe	No	No answer
91.3	4.4	-	4.4

G. Evaluation of lecturers and speakers

Item	Excellent	Very good	Good	Fair	No answer
1. Course Material	21.7	69.5	4.4	-	4.4
2. Resident lecture presentation	26.1	65.1	4.4	-	4.4
3. International lecture presentation	26.1	56.4	8.7	4.4	4.4
4. Ability of lecturers to answer specific questions	17.4	69.5	8.7	-	4.4

POSSIBLE FOLLOW-UP PROJECTS

In closing session, a general discussion on the possible projects involving countries in ASEAN region was held. The following suggestions were put forward by the participants:

- Development of catalytic processes for the production of fine chemicals from triglycerides and fatty acids of palm oil, palm kernel oil and coconut oils.
- Development of catalytic processes for the synthesis of fine chemicals from glycerol.
- To explore the utilization of biomass for the production of syngas, ethanol and fine chemicals.
- To develop new catalyst to replace existing nickel catalyst for the hydrogenation of vegetable oils and fatty acids.
- Development of clean technology using supercritical fluid as extraction and reaction medium for the production of nutraceuticals and fine chemicals.

Copies of key lectures presented during the workshop have been collected and are enclosed to the present report.

CLOSING CEREMONY

Dr. M.G. Clerici expressed his satisfaction of the high quality presentations by the lecturers and active participation of all participants.

APPENDIXES:

**Appendix 1:
BUDGET TABLE**

**Appendix 2
Detailed programme of the workshop**

Appendix 3

List of lecturers and participants (with full addresses)

Appendix 4

Copies of key lectures presented in the workshop