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Regional Workshop on Testing and Evaluation
of New Materials for Asia
Taejon, the Republic of Korea
25-28 March 1991

Report*

* This document has not been edited.

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INTRODUCTION

The Regional Workshop on Testing and Evaluation of New Materials for Asia was organized by UNIDO in cooperation with the Korea Standards Research Institute and held in Taejon, the Republic of Korea, from 25-28 March 1991.

The workshop was attended by the representatives of eight Asian countries and three international organizations, namely: People's Republic of China, India, Indonesia, Republic of Korea, Pakistan, Philippines, Singapore, Thailand, UNIDO, UNCSTD, and ESCAP. The list of participants is attached as Annex III

The main objectives of the workshop were to exchange experiences among the participating countries in the field of testing and evaluation of new materials; to identify the needs of selected developing countries in the Asian region and to assess the potential of regional cooperation in this area; and to discuss the mode and scope of cooperation and formulate recommendations and for strengthening the testing and evaluation capabilities in the participating Asian countries.

OPENING OF THE WORKSHOP

In opening the workshop, Mr. Bromley welcomed all the participants and thanked Dr. Rhee and his staff at KSRI for their excellent work in preparing for the workshop. He pointed out that this workshop covered one of the issues raised in the UNCSTD/ESCAP Regional Workshop on Advanced Materials Technology and Development in Asia and the Pacific held in Minsk in 1989.

Mr. Bromley outlined UNIDO's overall approach on the promotion of new technologies in support of the industrialization process in developing countries. He then described UNIDO's work in the field of new materials, stressing the importance of regional and international cooperation and the establishment of centres of excellence. In this connection he reported that the Republic of Korea and UNIDO were working on the preparation for establishing an International Materials Testing and Evaluation Centre.

Dr. Rhee, the President of KSRI, welcomed the participants to the Republic of Korea and KSRI. He highlighted the importance of new materials and the role they played in supporting the development of advanced technologies. Dr. Rhee stressed the fact that new materials with added value and advanced functions required more sophisticated and systematic techniques of testing and evaluation for their practical application. He pointed out that the testing and evaluation technique for new materials should be compatible and standardized at the regional and international level.

Dr. Rhee recalled that he had proposed at the Minsk Workshop in 1989 (referred to above) that a cooperational mechanism be established to promote collaboration on the development and standardization of new materials' testing and evaluation technique and he saw the current workshop as a response to his proposal.

He expressed the hope that the workshop would provide the opportunity for an exchange of experience and would result in agreement strengthening international cooperation in the field of testing and evaluation of new materials. Finally, Dr. Rhee indicated that the proposal for establishing an International Materials Testing and Evaluation Centre had the support of the Ministry of Science and Technology, KSRI, UNDP and UNIDO and he expressed the view that such an international centre would lead to even more cooperation in this field.

ELECTION OF OFFICERS

Dr. Hahngue Moon was elected chairman of the meeting by acclamation.
Ms. Adams-Yau Lee Ying was elected as vice-chairman and rapporteur.

ADOPTION OF AGENDA

The draft agenda was adopted as presented. (Annex I)

CONCLUSIONS AND RECOMMENDATIONS

To support the industrialization in developing countries through the introduction of new materials' testing and evaluation techniques in

order to improve the quality of products and meeting the environment control and energy saving requirements. The participants came to the following conclusions:

1. It is required to build up awareness of developing countries through monitoring, assessment and dissemination of information in the field of testing and evaluation of new materials.
2. It is necessary to gather and assess the information on new materials' evaluation techniques and testing technologies created in both developing and developed countries. This should include the information which institutions could provide concerning facilities and services in this area.
3. It was suggested to create a network in the field of materials testing and evaluation. For this network, local institutions or participating in the cooperating countries should be identified. The network activities should include cooperative work on materials classes and materials properties, relevant to the regional industries. The aim of the network is that every partner brings in expertise in a certain field and gets access to the expertise areas of the other partners.
4. More specific aspects of the network should be directed to standardization, quality control, certification, exchange of expertise on a regional and international level. A further aspect may be the possible development of an appropriate data base.
5. To initiate further actions, a questionnaire was suggested to be sent to the participating countries (e.g. governmental bodies and institutions). It may contain the main points as follows:
 - Country's policy towards industrialization and its priorities;
 - Status of testing and evaluation institutions/network of standards and testing institutions in the country;

- Plans for modernization of existing institutions with budget requirements;
 - Intention to join any regional organization and share information in the field of testing and evaluation of new materials;
 - Problems facing the country in this field;
 - Possible mode of cooperation and working areas at a regional and international level;
 - National focal point for such cooperation.
6. The workshop noted with appreciation the preparatory work being undertaken by the Republic of Korea and UNIDO for the establishment of an International Materials Testing and Evaluation Centre in the Republic of Korea.
7. The participants stressed that for a network to work effectively, regular contact would be needed. In this connection, Mr. Setty from India indicated he would examine the possibility of holding a regional workshop on testing and evaluation in India.

INTERNATIONAL ORGANIZATIONS

UNCSTD

The representative of UNCSTD referred to the ATAS Bulletin number 5 on materials technology and development which was the precursor for the Minsk meeting and UNCSTD's actions in this field. He pointed out that as a further follow-up activity is ATAS. An African Regional Workshop on Materials Technology will be held in Abidjan in April 1991. He also informed the workshop of future UNCSTD activities related to new materials, specifically a meeting on solar photovoltaics in Brazil in September 1991 and a meeting on superconductors in Moscow in April 1992.

ESCAP

The representative of ESCAP presented a report on his organization activities related to new materials. He stressed that ESCAP was giving special importance to the area of new technologies and was carrying out a number of projects in this field. He noted particularly the Seminar on Powder Metallurgy, held in India in 1989, and the Regional Workshop on Advanced Materials Technology and Development for Asia and the Pacific, held in Minsk in May 1989.

Presentations by participants

Each of the invited participants presented a short paper giving a brief account of ongoing programmes in the country in the field of new materials with a special reference to testing and evaluation issues. The participants have also outlined the problems facing their countries in this field and proposed how to overcome them through establishing a mechanism of regional/international cooperation. The abstracts of the country papers are presented in the Annex II.

Annex I

AGENDA

Monday, 25 March 1991

- 10:00 - 10:10 - Registration
- 10:10 - 11:00 - Opening of the Workshop
1. Opening address by Mr. Anthony Bromley
Chief of New Technologies Unit
UNIDO, Vienna
 2. Welcome address by Dr. Chunghee Rhee
President of KSRI
Republic of Korea
 3. Approval of Agenda
 4. Election of Chairmen and Co-chairmen
- 11:00 - 11:20 - Coffee Break
- 11:20 - 12:00 - Presentation of the Issue Paper
Professor Dr. Horst Czichos
Vice-President of BAM
FRG
- 12:00 - 13:30 - Lunch Break

Monday, 25 March 1991

Presentation of Country Papers

- 13:30 - 14:30 - 1. *New Materials in the Republic of Korea and Materials Evaluation Centre*
Dr. Hahn-gue Moon
Director, Materials Evaluation Centre, KSRI
Republic of Korea
2. *An Introduction to the Research and Development of New Materials in the People's Republic of China*
Mr. Yang Geng
China Metallurgical Standardization Research Institute
People's Republic of China
- 14:30 - 15:00 - Coffee Break
- 15:00 - 16:00 - 3. *Testing and Evaluation of New Materials: Status, Problems and Suggestions for Regional Cooperation*
Mr. Srinivasa Setty
Computer Maintenance Corporation Ltd.,
India
- 18:00 - 20:00 - Dinner hosted by the President of KSRI

Tuesday, 26 March 1991

Presentation of Country Papers

- 10:00 - 11:00 - 4. *Indonesian Case: Current Status of New Materials Development*
Dr. Nilyardi Kahar
R & D Centre for Applied Physics,
Indonesia
- 11:00 - 11:30 - Coffee Break
- 11:30 - 12:30 - 5. *Status and Plan of Research and Development*
Mr. Sajid Hussain Chattha
Ministry of Industries,
Pakistan
6. *Role of Industrial Technology Development Institute in the Testing of Materials/Products in the Philippines*
Ms. Esmeralda Martinez
Industrial Technology Development Institute,
Philippines
- 12:30 - 13:30 - Lunch Break
- 13:30 - 14:30 - 7. *Current Status in the Field of New Materials in Singapore*
Ms. Adams-Yau Lee Ying
Singapore Institute of Standards and Industrial Research,
Singapore
8. *Country Report on Status of New Materials in Thailand*
Dr. Nongluck Pankurdee
Thailand Institute of Scientific and Technological Research,
Bangkok,
Thailand
- 14:30 - 15:00 - Coffee Break
- 15:00 - 17:00 - Discussion on Mode and Scope of Regional Cooperation

Wednesday, 27 March 1991

- 09:30 - 10:30 - Discussion on Mode and Scope of Regional Cooperation
- 10:30 - 12:00 - Observation of KSRI laboratories and taking a photo
- 12:00 - 13:30 - Lunch Break
- 13:30 - 15:00 - Discussion on Recommendations of the Workshop
- 15:00 - 15:30 - Coffee Break
- 15:30 - 17:00 - Discussion on Recommendations of the Workshop

Thursday, 28 March 1991

- 09:30 - 10:30 - Adoption of the Recommendations of the Workshop
- 10:30 - 11:00 - Coffee Break
- 11:00 - 11:30 - Closing of the Workshop
 1. Brief overview of the workshop recommendations by
Professor Dr. Horst Czichos
BAM,
FRG
 2. Closing remarks by
Dr. Chunghi Rhee
KSRI,
Republic of Korea
- 11:30 - 13:00 - Lunch Break
- 13:00 - 15:00 - Move to Suwon, Kyongki-do, from KSRI
- 15:00 - 16:00 - Visiting Samsung Electronics Co.
- 17:00 - Departure for Seoul

Annex II
ISSUE PAPER

Professor Czichos presented the issue paper. In this overview, he considered the state of materials science and technology and the trends in advanced materials development together with the needs for materials testing and standardization.

Materials constitute the physical matter of all things produced by humans, they are thus a key factor in the technological and economic development of all nations. "New" and "advanced" materials may be roughly defined as substances with a new chemical composition or microstructure, or as materials with new or improved properties, or as substances or components manufactured by new or improved processes leading to potential new applications. Advances in materials are in progress in all main classes and were discussed as follows:

- (a) Structural materials, defined mainly by their mechanical and thermal properties (including metals, ceramics, polymers and composites)
- (b) Functional materials characterized mainly by their magnetic or optical functions (including semiconductors, optical fibres, solar cells, and superconducting and magnetic materials)
- (c) Civil engineering materials (including cement, concrete and plasters)
- (d) Renewable materials (including wood and wood-based materials)
- (e) Biomedical materials

Materials technologies must be seen as part of the "total product cycle", from raw materials processing to the engineering of materials, the design and production of components, the performance of technical products and systems, and finally the deposition or preferably the recycling of materials. For a strategy to increase the value contents of products and structures, research and development must result in materials of high consistency, quality and reliability, and with improved performance, durability and processability; besides that environmental regulations must be met in the development and application of new materials.

Measurement, testing and performance evaluation are crucial in assessing the value of new materials. Thus, all industrialized and industrializing countries have clearly recognized the prime importance of standards and test

methods as a means of encouraging market penetration of new materials and of products containing new materials. As an example, the Japanese industrial materials standards can be classified into the following categories: (i) Product standards: shape, dimension, quality, performance, etc. (about 5 000) (ii) Method standards: testing, analysis, inspection and measuring, etc. (about 2,000) (iii) Basic standards: terminologies, units, symbols, etc. (about 1,000).

As an example of the importance of international pre-standardization, an activity within the member countries of the Economic Summit (Canada, France, Germany, Italy, Japan, UK, USA), the VAMAS cooperation (Versailles Project on Advanced Materials and Standards) was outlined. VAMAS is aiming at providing the technical basis for drafting codes of practice and specifications for advanced materials. The scope of the collaboration focuses on all agreed aspects of enabling science and technology - data base, test methods, design methods and materials technology - which are required as a precursor to the drafting of standards for advanced materials. VAMAS activities emphasise collaboration on pre-standards measurement research, intercomparison of test results, and consolidation of existing views on priorities for standardization action. There are technical working groups in the following areas:

- (a) Materials technologies: Ceramics - Polymer blends - Polymer composites - superconducting and cryogenic structural materials - Bioengineering materials
- (b) Materials characterization: Unified classification system for advanced ceramics - Materials data banks
- (c) Materials performance: Efficient test procedure for polymer properties - creep crack growth - wear test methods - hot salt corrosion resistance - low cycle fatigue - surface chemical analysis.

Professor Czichos concluded the issue paper by indicating that these topics are of current interest in the areas of advanced materials and the connected requirements for materials testing and standardization.

**An Introduction to the Research and Development of
New Materials in the People's Republic of China**

Abstract of Country Paper

**Mr. Jang Geng
China Metallurgical Standardization Research Institute
Beijing, People's Republic of China**

With the economic and industrial development in China, the exploration, research, production and application of new materials have reached a broad scale and significant progress has been made in some areas. The Chinese Academy of Science, institutes belonging to Ministries, universities and laboratories belonging to big corporations have done a lot of research work. Since 1984, the Government has invested a great deal of money to establish a number of open laboratories in the Chinese Academy of Science, key universities and institutes to promote the development of new materials.

Now the major areas of development of new materials in China are as follows:

1. Composite Materials
 - Combination of matrix materials
 - Strengthening materials

2. New structure materials (high temperature, corrosion resistance and high strength)
 - Aluminium alloys
 - Titanium alloys
 - High temperature alloys
 - Engineering ceramics

3. Information Functional Materials
 - Semiconductor materials
 - Informations recording materials

4. Energy Source Functional Materials
 - High temperature Superconductor Materials
 - Hard Magnetic Materials

Suggestions:

A. National

1. Pay attention to the testing and evaluation of new materials with the research of new materials as the same position.
2. Development of standards (testing methods) for new materials.
3. Establishment of laboratories with advanced equipment for testing and evaluation of new materials.
4. Exchange of information with other countries to catch up to the advanced technology in the world, thus promoting progress of technology and development of new materials in China.

B. Regional

1. As the areas of development for new materials are different in every country, it is important to find the common points for cooperation.
2. Establishment of a regional network on new materials for information exchange.
3. Harmonization of the standards at regional and international level.

**Testing and Evaluation of New Materials:
Status, Problems and Suggestions for Regional Cooperation**

Abstract of Country Paper

**Mr. Srinivasa Setty
Computer Maintenance Corporation Ltd.
India**

Status

Several national laboratories, R & D institutions, academic institutions and industrial houses are involved in the development, testing and application of new materials in India.

Extensive facilities have been established in different laboratories for testing and evaluation.

Working areas of interest

- Engineering ceramics
- Composites
- Superconducting materials
- Miscellaneous
- High performance surface-engineered materials
- Dissimilar clad materials
- Thin films
- Electronic materials
- Magnetic materials
- Single crystalline materials

Mode of operation

- Identification of focal points
- Assessing existing facilities in the context of increasing areas of new materials application
- Identifying specific areas of specialization under regional cooperative efforts
- Commitments in terms of information exchange/exchange of experts and experience/funds are to be sought from each country

Offer for regional cooperation

- TIFAC of DST (Government of India) offers to assist in the creation of data bases/experts data base and technical data base at both national and regional level

Indonesian Case: Current Status of New Materials Development

Abstract of Country Paper

Dr. Nilyardi Kahara
Head of Division of Materials Science and Technology
Research and Development Centre for Applied Physics
Bandung, Indonesia

1. Institutes involved in testing and evaluation of new materials:
 - Laboratories under the Indonesia Institute of Science
 - Laboratories under the Agency for Development and Application of Technology
 - Laboratories under the National Atomic Energy Commission
 - Laboratories under the Department of Industry
 - Laboratories under the Department of Telecommunication
 - Laboratories under the Department of Mining and Energy
 - Laboratories under the Department of Agriculture
 - Laboratories under the Department of Trade
 - Laboratories in Core Universities
2. Action needed at national level
 - Network on new materials' activities/inter-laboratories
 - Upgradation of skill and knowledge
 - Formulation of integrated programmes levelled on needs and capabilities assessment
 - Promote interaction between laboratories and industries
3. Possible mode of regional cooperation
 - Participation in the regional network on testing and evaluation of new materials
 - Information network on state-of-the-art and activities of new materials and standard testing
 - Participation in international/regional programme on skill and knowledge development in testing and evaluation of new materials
4. If there is a possibility to create a regional centre, Indonesia would be very much interested in the characterization of organic-levelled new materials.

New Materials in the Republic of Korea and Materials Evaluation Centre

Abstract of Country Paper

Dr. Halmgue Moon

Director

Materials Evaluation Centre

Korea Standards Research Institute

Taejon,

Republic of Korea

1. Introduction

The enthusiasm for the development of new materials, which caught fire in the industrially developed countries in the 1970s, has recently been spreading to developing countries through out the world. However, most of the developing countries are not technologically well prepared for this materials revolution. Therefore, UNIDO has worked hard, through organizing discussion meetings and workshops, to play a pivotal role as a catalyst in international cooperation, which is essential to help developing countries in building an adequate level of technological capability for the development and the application of new materials. This workshop is also one of those efforts.

One of the crucial problems of developing countries is the lack of adequate testing and evaluation technology for new materials. And this is the problem which above all requires international cooperation. Even the seven most industrialized countries acknowledged the need for developing new evaluation techniques of new materials and for international cooperation in their standardization, and launched the Versailles Project on Advanced Materials and Standards in 1982. We, developing countries, should also do something nationally, regionally and globally to survive this new materials era.

2. New Materials in the Republic of Korea

(a) Research and Development

The R&D activities on new materials in the Republic of Korea started in the early 1980s mostly in the government supported research institutes and universities and, recently, has been spreading to research institutes run by private enterprises. There are two group of government sponsored research projects in science and technology in Korea; one is Specified National R&D Project (SNRDP)

supervised by the Ministry of Science and Technology (MOST) and the other is Industrial Base Technology Development Project (IBTDP) supervised by the Ministry of Trade and Industry (MOTI). SDRP is long-term and basic research oriented, while IBTDP is short-term and practical application oriented.

(b) Production and Application

High-technology industries such as computer and electronics have grown rapidly in the 1980s. This resulted in the expansion of the domestic market of high-technology products and, accordingly, of new materials, which were necessary for manufacturing high-technology products. The market size of new materials in the Republic of Korea is expected to grow continuously with an annual growth rate of around 20% during the 1990s.

(c) Standardization and Laboratory Accreditation

With the expansion of economic scale in the Republic of Korea, the focus of R&D activities of industry have been moving from mass product items to high value additive items. As a result, the importance of testing and evaluation technology began to be recognized in industries. In addition, the lack of standardized testing and evaluation methods for new materials appeared as an obstacle to their wide applications because of the discrepancies of the test results between makers and users. In 1988, Industrial Advancement Administration (IAA) prepared the plan of standardization of test methods for new materials. However, because of the difficulties in the development and standardization of test methods for new materials, it will take some time and lots of research effort to get some concrete outputs.

3. Functions

(a) Research and Development

- Basic research on new principles/new phenomena
- Development of characterization technology
- Development of techniques and equipments for materials evaluation

(b) Standardization

- Research on the standardization of materials evaluation methods

- Organization of an inter-laboratory cooperation system for testing and analysis
- Promotion of international collaboration and joint research

(c) Service

- Materials evaluation service
- Operation of materials data bank

4. Proposal for Actions

(a) National Level

Every country should be encouraged to establish national centres for testing and evaluation of new materials with the following functions:

- Research and development
 - Characteristics of materials
 - Testing and evaluation techniques
 - Standardization
- Service
 - Testing and evaluation
 - Training
 - Data bank

Furthermore, a national network of materials testing organizations needs to be established to function as:

- Service network
- Prestandardization research network, and
- Laboratory accreditation network

(b) Establishment of a regional network on materials evaluation

The activities of this network may include:

- Implementation of joint research on the development and the standardization of testing and evaluation methods

- Exchange of researchers
- Exchange of materials data
- Exchange of testing and evaluation service
- Accreditation of test laboratories

One of the national centres may be designated as the regional centre and may conduct the following activities:

- Coordination of network activities
- Provision of testing and evaluation service
- Operation of data bank
- Organization of workshops and training programmes.

(c) Global level

Developing countries need inputs such as materials data and new evaluation techniques from developed countries and also from developing countries of other regions to enhance their ability to develop and apply new materials. Developing countries should also participate in the development of world standards of new materials from the stage of prestandardization research. One way of meeting these needs is the networking of regional centres together with national centres of developed countries and possibly also with special international centres such as International Centre for High Technology and New Materials, which has recently been established in Trieste, Italy as an international project implemented by UNIDO. It may also be desirable to establish an international centre specialized in materials testing and evaluation. This global network, as a testing service network, may function as an international laboratory accreditation system. This network, as a prestandardization research network, should cooperate closely with international standardization bodies such as ISO and IEC.

Status and Plan of Research and Development

Abstract of Country Paper

**Mr. Sajid Hussain Chattha
Joint Secretary
Ministry of Industries
Islamabad, Pakistan**

Status

The following institutions have been assigned the responsibility of R&D and quality control:

1. Pakistan Council of Scientific and Industrial Research Laboratory
2. Material Physical Laboratory
3. Metal Industrial Research and Development Centre
4. Textile Industrial Research Centre
5. Central Testing Laboratory
6. Pakistan Standard Institute
7. Pakistan Industrial Technology Centre

The research work has been undertaken by:

1. PCSIR Laboratory
2. National Physical Standard Laboratory
3. Leather Research Centre
4. Fuel Research Centre
5. Pak Swiss Training Centre
6. Solar Energy Centre
7. PCSIR Camp Office, Quetta

Production and Application of New Materials:

1. Heavy Mechanical Complex
2. Pakistan Machine Test Factory

Problems in the testing and evaluation of new materials:

1. National standards suffer from procedural constraints

2. Resource constraint
3. Lack of quality consciousness
4. Technology transfer is slow
5. Lack of Expertise
6. Financial constraint
7. Non-Recognition in the international market

Suggestions:

1. Standardization/Quality control of product and identification of new materials
2. Acquisition of equipment and development of new technology
3. Certification of products
4. Exchange of information
5. Setting up of Laboratories at regional and international level
6. Publication
7. Collection of information and its timely dissemination

**Role of Industrial Technology Development Institute in the
Testing of Materials/Products in the Philippines**

Abstract of Country Paper

**Ms. Esmeralda Martinez
Senior Science Research Specialist
Materials Science Division
Industrial Technology Development Institute
Manila, Philippines**

Status of New Materials in the Philippines

1. R & D Fine Ceramics (just started)

This year, we shall start to undertake characterization studies of raw material oxides for fine ceramics and their proceeds, studying their processing and sintering properties and their behaviour in addition with other materials, especially the selection of binders. Next year and the year to come, we will attempt to study isostatic pressing and other current techniques of processing fine ceramics, including sintering and machining. The long-range plan is to set up a fine ceramics laboratory equipped with highly trained and highly educated research staff capable of promoting science and engineering associated to ceramics.

2. Polymers

- (a) Start the characterization studies of raw materials and a little of recycling
- (b) Establishment of plastic research and development centre is being worked out by concerned government agencies headed by our institute, ITDI, and the academe and firms in the plastic processing industry.

A. Problems

- 1. Upgrading/modernization of facilities
- 2. Standardization of test methods for new materials (new)

B. Suggestions

- 1. Like the suggestions of Mr. Setty from India, to use an information technology network systems for dissemination of information on advancements in the development of these new materials, testing,

evaluation and their application, both on a national and regional level.

2. Cooperation with foreign countries on:
 - (a) financial assistance
 - (b) manpower development
 - (c) equipment
3. Methods/techniques for testing/evaluation of new materials should be developed.

Current Status in the Field of New Materials in Singapore

Abstract of Country Paper

Ms. Adams-Yan Lee Ying
Manager
Polymer Technology Centre
Singapore Institute of Standards and Industrial Research
Singapore

Current Status

1. Evaluation of new materials relatively new to Singapore
2. R & D on materials technology include:
 - Iron and steel products
 - Engineering plastics
 - Composite
 - Functional materials for electronics
 - Chemical technology
3. Basic infrastructure on materials testing available
 - A. Problems in Testing New Materials
 - Lack of standard test procedures to evaluate properties of new engineering plastics, composites, and other functional materials
 - Lack of standard test procedures to test the microstructure of new materials
 - Lack of standard test procedures to determine the durability and long-term behaviour of materials
 - Lack of standard test procedures to conduct environmental engineering and monitoring
 - Lack of standard test procedures for micro-contamination analyses
 - B. Needs and Goals

To develop and/or acquire skills, capability and knowledge that will address the problems in Item A

C. Purpose of Cooperation

To strengthen the industrialization programme (new)

D. Identification of Working Areas

(a) Classes of materials

(i) Engineering and high performance thermoplastic materials, such as polymer blends/alloy

(ii) Composites

(iii) Metal alloys, such as Ni-based and Titanium-based

(b) Properties to be investigated

(i) Thermal

(ii) Surface properties

(iii) Mechanical and structural analysis

(iv) Durability and long-term

(v) Magnetic

(vi) Optical

(vii) Residual life assessment

(viii) Morphology and microstructural

E. Mode of Operation

Each country to have one flag-ship project depending on the availability of:

- research manpower
- facilities
- capability
- funds,

and providing that proposed flag-ship project is of mutual interest and benefit.

There could be two or more countries working on the same class of material or on the same technologies/properties.

Country Report on Status of New Materials in Thailand

Abstract of Country Paper

**Dr. Nongluck Pankurdee
Senior Researcher
Metal and Material Technology Department
Thailand Institute of Scientific and Technological Research
Bangkok, Thailand**

1. Current status in the field of new materials

The research and development in new materials has just started. Only a few institutions for materials testing and evaluation have been established, and the testing and evaluation techniques have not yet met the international standards. The research and development plans are:

- 1) To develop a process to utilize minerals and resources that are available in the countries for new materials
- 2) To evaluate new material quality
- 3) To utilize these new materials for basic applications

Research and development concerned with electronic and engineering ceramics, polymer, metal and few composite.

2. Problem with testing and evaluation of new materials

- 1) Limited budget for facilities and etc.
- 2) Human resources (scientists and engineers) lack skill and experience
- 3) The standard technology is on a low level
- 4) Private sectors lack interest in research and development as a means of improving production efficiency

3. Suggestions to overcome the problems

Cooperation among developed and developing countries is essential to

- 1) Systematize the testing and evaluation methods
- 2) Harmonize the testing and evaluation techniques
- 3) Establish a regional network
- 4) Collaborate in research activities

Annex III

List of Participants

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