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NEW AND ADVANCED MATERIALS:
THE EGYPTIAN CASE*

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INTRODUCTION

As an umbrella for Science and Technology (S&T), the Egyptian Academy of Scientific Research and Technology (ASRT) under the auspices of the Ministry of State for Scientific Research, undertook the formulation of the National S&T Policy since the early eighties. By mid 1984 the National Document entitled "The National Technology Policy" was issued and approved. In that Document, New and Advanced Materials (N&AM) were acknowledged as one of prominent frontier areas that have to be urgently tackled. Such policy objective has to be converted into viable action plans with specified targets and tasks. An early stage in this regard is the study an planning phase to provide a solid background for setting suitable action plans.

PROGRAMME AND ACTIONS

By the late eighties a national study has been commissioned by the ASRT as a prerequisite for the planning phase. In 1990, the first phase of this study has been reported in four volumes covering:

1. A general overview;
2. Metals, alloys and inorganic materials;
3. Materials in the field of energy and information;
4. Organic materials.

The last three volumes have been heavily oriented towards reporting a comprehensive literature survey stressing the scientific background and the international status of these technologies.

The following topics have been addressed in these last three volumes:

Volume 2: Superalloys, High Strength Low Alloy (HSLA) Steels, Rapidly Solidified Alloys, Composite Materials, Advanced Ceramics and Optical Fibers.

Volume 3: Semiconductors, Optical Phenomena, Dielectric Materials and Application, Magnetic Materials, Conductors, Superconductors, Sensors, and Electrochemical Materials.

Volume 4: Polymers, Composites, Biomaterials, Catalysts, Natural Products, Synthetic Drugs, Photochemistry.

The overview, in volume 1, provided a concise introductory part to the other 3 volumes. It touched upon such relevant subjects as recent developments and their causal factors, international consumption trends, major economic uses, future outlook, relevant S&T policies in both developed and developing countries.

The status of N&AM in Egypt is being surveyed, both on the R&D level and on the manufacturing side. Assessment of future outlook is still in a preparatory stage of work.

Preliminary findings indicate that:

1. The whole domain of N&AM is still in its infancy in Egypt.
2. Much impetus has been given to R&D endeavours as manifested by starting new lines of research in the field and establishment of specialized departments in some R&D institutes, like the National Research Center which established a N&AM department under the auspices of the Physics division with strong linkage to the Engineering division.
3. The Ministry of Scientific Research is presently planning - among several institutes - a new national and regional institute for New and Advanced Materials at Mubarak City for Scientific Research and Technology at Borg El-Arab near Alexandria (A new S&T Park).

BASIC PREMISES AND VIEWS

- **New and Advanced Materials are reshaping our Globe and are anticipated to contribute much to future technological development.**
- **N&AM, in major parts, depend upon carefully designed structures at the molecular and microscopic levels to achieve specific performance in use.**
- **The process technology used in manufacturing N&AM is a controlling and a very demanding factor.**
- **In many instances, new fabricating and application methods have to be devised to suit the properties and requirements of use of N&AM, (for example, chemical methods have to replace mechanical methods to adequately and reliably cope with the composite materials of the future).**
- **The impact of N&AM is multi-sectoral covering the whole spectrum of applications in industry, communications, energy, etc.**
- **The types and characteristics of N&AM have to conform with real social needs. For instance, in many developing countries, such as Egypt, developmental objectives may vary considerably from those of developed countries.**
- **To be able to meet the R&D and manufacturing requirements for needed N&AM, a critical mass of capabilities and resources has to exist, and can very well exceed those of many single developing countries.**
- **The field of N&AM is multi-disciplinary and interactive between many basic sciences, engineering and industry.**
- **Success in the field of N&AM would lean heavily on the existence of a strong pertinent education, training, R&D base, as well as a viable relationship between the Science and Technology institutions and industry.**