

CONTENTS

Foreword	III
Executive summary	XI
Acknowledgement	XV
Explanatory notes	XVI

Overview

Materials : a perspective	3
Materials : the development dimensions	8
Materials : the economic implications	15

The technology

Synopsis	19
The materials cycle	20
Raw material resources	24
Structural materials : metals, ceramics, polymers and composites	31
Functional materials : electronics, information and sensors	43
Civil engineering materials : cement, concrete and plaster	48
Renewable materials : wood and wood-based materials	53
Biomedical materials	56

Implications for development

Synopsis	61
The effect of new materials on traditional technologies in developing countries	62
Modernization requirements : the example of the bauxite industry in Guyana	65
Materials technology and trade implications	67
Promising materials developments : the example of composites	71
Comparison of natural and synthetic materials	76
New products resulting from advances in materials technologies	80
Substitutions resulting from advances in materials technologies	88

Capacity building

Synopsis	94
Capacity building for materials science and technology in developing countries	95
Infrastructure building from materials-related industries	98
The need for interdisciplinary research and development structures	103
Materials technology forecasting	105
Options in materials development	107

Experience and case studies

Africa	
Ghana	110
Nigeria	115
Sudan	117
Asia	
India	119
Republic of Korea	120
Latin America	
Argentina	121
Brazil	124

Policy options

Synopsis	127
Explicit and implicit policies in materials technology	128
Collaborative industrial research approaches : strategies in the Federal Republic of Germany	133
International co-operation : the Versailles Project on Advanced Materials and Standards	135
Policies in newly industrialized countries : the case of Brazil	137
Access to materials technology by developing countries	140

Annexes

I. The United Nations system and materials technology	143
Economic Commission for Europe	143
United Nations Conference on Trade and Development	143
United Nations University	143

United Nations Educational, Scientific and Cultural Organization	143
International Maritime Organization	144
United Nations Industrial Development Organization	144
II. The Advance Technology Alert System	146
III. United Nations Centre for Science and Technology for Development	147
IV. Bibliography, references and notes	148
V. Index	154