Preface

This special edition presents a collection of contemporary research results across key areas of materials science, with a focus on structural metals, bio-based polymers, functional materials for sensing and photovoltaics, and catalytic materials and processes. Both fundamental studies and technological innovations shaping current and emerging applications are highlighted.

Chapter 1: Steel and Alloys explores advances in the development, processing, and performance of structural metallic materials. Emphasis is placed on the relationships between microstructure and property, synthesis strategies, and manufacturing technologies that provide high-performance and sustainable engineering solutions.

Chapter 2: Bio-Based Polymers focuses on renewable polymeric materials and environmentally friendly synthesis and processing approaches. Topics include synthesis pathways analysis, structure–property optimisation, biodegradability, and applications that support sustainable development in materials science based on circular economy principles.

Chapter 3: Materials for Sensors and Photovoltaic Applications presents studies on functional materials designed for energy conversion and harvesting, as well as detection and signal transduction. Emphasis is placed on semiconductors, nanomaterials, thin films, and hybrid systems that enable next-generation sensing technologies and efficient photovoltaic devices.

Chapter 4: Catalysts and Catalytic Processes examines the catalytic materials and reaction processes crucial for chemical production, energy applications, and environmental remediation. The chapter highlights catalyst design, their properties studies, and advanced catalytic technologies aimed at improving efficiency and sustainability.

This special edition is intended to serve as a valuable resource for researchers, engineers, and students seeking insight into innovative approaches to materials development, sustainable technologies, and their functional applications across diverse fields.