

Preface

This special edition focuses on investigations of functional materials and systems that enable advanced solutions for energy supply and conversion devices, sensing, and mechatronic applications. The articles explore the applications of shape memory alloys in heat engines and refrigeration, as well as hydrogen sensing, alongside magnetostrictive materials and memory devices, with an emphasis on enhancing their functional properties. Techniques for non-destructive inspection, including X-ray stress measurement, are presented in support of reliability and performance assessment. The edition also covers materials and processes for electrochemical energy technologies—such as metal–air batteries, ion-exchange materials, and ionomer membranes for fuel cells—as well as polymeric and metallic materials, including epoxy resins and aluminium alloys. Advanced manufacturing, solder joints, and electroplated coatings based on plasma-enhanced chemical vapour deposition are also discussed.

The edition provides an integrated perspective on materials design, processing, and application in mechatronic and energy conversion devices.