

Preface

This special edition focuses on advanced coating technologies and analysis of structural metal corrosion behaviour, addressing the growing demand for enhanced corrosion resistance and excellent mechanical and operational performance in modern steels, alloys and superalloys. The contributions explore a wide range of structural metallic materials, including magnesium alloys, refractory metals, and medium- and high-entropy alloy anticorrosion coatings, with a focus also on high-entropy nitride coatings and anodised aluminium oxide films. Processing routes, including electroless deposition, cold spray, and cladding, are examined in relation to microstructure development, grain size refinement, and crystal structure features. Fundamental and applied aspects of corrosion phenomena—such as exfoliation corrosion and oxygen-induced damage—are discussed in relation to their impact on mechanical properties. The articles provide an integrated view of the structure–property–performance relationships in advanced protective coatings and metals under aggressive environmental conditions.