Preface

Materials chemomechanics is an exciting and fast growing field where mechanics meets chemistry, and has drawn increasing attention in recent years. It is concerned with the phenomena and mechanisms of coupled chemical and mechanical interactions. Chemomechanical coupling phenomena exist in many research areas, ranging from the development of advanced batteries, biomechanical engineering, hydrogen embrittlement, and high temperature oxidation. In fact, a typical chemomechanical problem usually involves the processes of diffusion, chemical reaction, deformation and stress generation. Such a strong coupling between chemistry and mechanics can give rise to the complex spatial-temporal evolution of composition, micro-structure and morphology in materials.

Facing the challenges in the chemomechanical coupling field, understanding such chemomechanical complexities may lead to theoretical and technological development with a huge scientific and economic impact. This special topic mainly focuses on presenting a comprehensive overview of the most recent science and technology advances in this field. We have gladly collected 12 high quality papers in this area, including 4 review articles, 7 research reports, and 1 perspective. These papers cover the fundamental concepts, novel experiments, theories and numerical modellings of chemomechanical coupling problems. From these papers, we could identify challenges and opportunities for tackling the long-standing and emerging problems for the chemomechanical coupling field.

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We hope that this special topic would be useful for researchers to better understand the chemomechanical coupling phenomena and to advance their own investigations of chemomechanical coupling problems.

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