

Special Issue

Advanced Electrode Design for Metal–Air Batteries

Message from the Guest Editors

Metal–air batteries (MABs) have emerged as one of the most promising candidates for next-generation energy storage systems, offering ultra-high theoretical energy densities. They hold immense potential for applications ranging from electric vehicles to large-scale grid storage. However, their widespread implementation is currently impeded by severe technical challenges associated with electrode stability and reaction kinetics. On the anode side, metal electrodes (e.g., Li, Zn, Al, Mg) may suffer from uncontrolled dendrite growth, passivation, and corrosion, which compromise safety and cycle life. Simultaneously, the air cathode is limited by the sluggish kinetics of oxygen reduction and evolution reactions (ORR/OER), high overpotentials, and catalyst degradation. To overcome these challenges, the rational design of advanced electrode architectures and interfaces is paramount.

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