Corrosion protection of lithium battery anode materials

Chengbin Jin[1,*], Ouwei Sheng[2], Qiang Zhang[3], Xinyong Tao[4]

[1]*College of Materials and Chemistry, China Jiliang University, Hangzhou, Zhejiang, China*
[2]*College of Materials and Environmental Engineering, Hangzhou Dianzi University, Hangzhou, Zhejiang, China*
[3]*Department of Chemical Engineering, Tsinghua University, Beijing, China*
[4]*College of Materials, Zhejiang University of Technology, Hangzhou, Zhejiang, China*

Presenter's e-mail address: jincb@cjlu.edu.cn

Abstract

Lithium metal negative electrode cause the generation and accumulation of dead lithium due to unstable SEI film, dendrite growth, and interface corrosion, which seriously deteriorates battery performance and life. Lithium corrosion involves chemical and electrochemical corrosion, resulting in rapid loss of battery active substances, and substantial attenuation of battery performance and life. Through cryo-electron microscopy and three-electrode electrochemical technology, the corrosion science of the battery was deeply analyzed. The effective strategy of passivation protection of the negative electrode by organic/inorganic composite coating was proposed. The corrosion inhibition rate reached 74%, and the battery cycle life was increased several times.

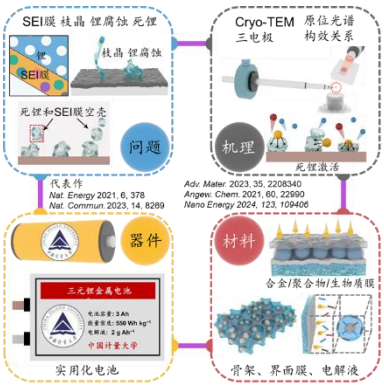

Fig. 1 金属锂负极失效调控

Keywords Lithium Metal, Interface, Failure Mechanism, Corrosion, Control Strategy

Reference

[1] C. B. Jin, et al Rejuvenating dead lithium supply in lithium metal anodes by iodine redox. Nat. Energy 2021, 6 (4), 378-387.

[2] C. B. Jin, et al A corrosion inhibiting layer to tackle the irreversible lithium loss in lithium metal batteries. Nat. Commun. 2023, 14, 8269.

[3] C. B. Jin, et al Taming solvent-solute interaction accelerates interfacial kinetics in low-temperature lithium-metal batteries. Adv. Mater. 2023, 35 (3), 2208340.

[4] C. B. Jin, et al Reclaiming inactive lithium with a triiodide/iodide redox couple for practical lithium metal batteries. Angew. Chem. 2021, 60 (42), 22990-22995.