

High thermal stable SEI in Li-ion batteries

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Abstract:

Lithium-ion batteries (LIBs) provide power for a variety of applications from the portable electronics to electric vehicles, and now they are supporting the smart grid. Safety of LIBs is of paramount importance in these scenarios. Specifically, thermal safety arouses increasing attention with the piling-up of LIBs. Thermal runaway of LIBs is believed to originate from the exothermic reactions starting from the breakdown of the solid/cathode electrolyte interphase (SEI/CEI). To mitigate this challenge for a safe operation of LIBs, one straightforward and low-cost method is to build thermally stable SEI/CEI. Here we report our research efforts and understanding on the thermal behaviors of SEI/CEI. We have compare the impact of the electrolyte composition and the formation process of SEI/CEI . It is identified that the stable lithium salts coupled with solvents of high boiling point is one way to enhance thermal stability of the battery system. In addition, the unsaturated bonds, halogen, phosphorus, sulfur, phenol, organic borate, borane, and silane are functional components to facilitate the formation of a thermally stable SEI/CEI, which is the immediate solution to boost thermal stability of high capacity electrodes. Moreover, in-situ polymerization/solidification is effective method in enhancing simultaneously the electrochemical, chemical and thermal stability. Finally, we revealed the interaction between SEI and CEI, and identified that only by constructing a stable SEI/CEI simultaneously we could develop a battery system of solid electrolyte interphases of high thermal stability.

References:

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Biography:



Hong Li is a professor in Institute of Physics, Chinese Academy of Sciences. His current interests are high energy density lithium batteries, solid batteries and fundamental solid state ionic problems. He has published over 400 papers in peer-reviewed journals with over 30000 times citation and the H-factor is 96. He has filed over 200 patents and 60 have been granted. He is the regional editor of Solid State Ionics, Ionics and Journal of Materiomics. He serves as the scientific committee member of MOST and MIIT in China. He is a board member in International Meeting of Lithium batteries and International Society of Solid State Ionics.