Electrochemical and structural evaluation for all-solid-state batteries using mixture of conductive additives in sheet-type composite cathode

Jiu Ann, Sunho Choi, Chanhwi Park and Dongwook Shin *

Division of Materials Science and Engineering, Hanyang University,
222 Wangsimni-ro, Seongdong-gu, Seoul, Korea, 133-791

E-mail: dwshin@hanyang.ac.kr

Keywords: Conductive additive mixture, solution-based process, Sulfide solid electrolyte, All-solid-state battery

Abstract

Lithium ion batteries(LIB) with liquid electrolytes were limited to be employed by large-scale power source for electrical vehicle(EV) due to their flammability. Therefore, all-solid-state batteries(ASSB) using inorganic sulfide-based solid electrolytes are considered prospective alternative to existing LIB owing to their benefits such as non-flammability, high ion conductivities, a wide electrochemical window.

However, the ASSB fabricated by dry mixing method had difficult to procure higher uniformity of the electrode components because all of the constituents are solid powders. Consequently, discontinuous electron conducting network between active materials and conductive additives causes high charge transfer resistance in cathode composite, resulting in capacity fade. Therefore, it is important to construct an effective electron conducting network in the composite cathode.

In this study, mixture of fibrous VGCF and spherical electronic conducting agents like Super P was used to improve rate performance by fabricating long and short range conducting network in sheet-type composite cathode for ASSB. We adopted solution-based process to get uniform dispersion state of the electrode components with carbon material in the slurry. Then, we investigated effects on mixture of conductive additives by evaluating electrochemical properties and its morphology.

Acknowledgement:
This work was supported by the Dual Use Technology Program of the Institute of Civil Military Technology Cooperation granted financial resources from the Ministry of Trade, Industry & Energy and Defense Acquisition Program Administration (17-CM-EN-11).