3D printing of high-performance electrodes for all-solid-state rechargeable lithium-ion batteries

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Three-Dimensional (3D) electrode architecture of lithium-ion batteries (LIBs) is a new generation energy storage system with high energy and high-power capacity to satisfy high consumer demands, especially for its application in biomedical, electrical vehicles, and portable electronics. The printing process of this 3D architecture electrode was made possible through the ink-extrusion method, which has offered a supper balance promise between high energy density and power density. Moreover, the 3D printing framework is a simple and low-cost alternative to traditional lithium-ion electrode setups, which maintains an excellent electrochemical property of higher specific capacity and cyclic stability. Here, this study investigates the high performance and optimization of 3D-printed electrodes of NMC (Cathode) and Mxene (anode) for all-solid-state lithium-ion rechargeable batteries (ASSLRB). However, different electrode inks with proportions of 80:10:10, 70:15:15, and printing pressure of 108kPa and 120kPa, respectively, were employed during slurry optimization (Figure 1). We recommend that 3D printing of electrode conductive filaments delivers stress-free and less time fabrication setups while maintaining high energy capacity for the next generation of high-performance energy storage devices.

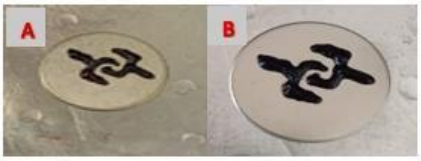

Figure 1. Illustrate different 3D printed electrodes with different proportions and printing pressure (a) 80:10:10/108kPa, (b) 70:15:15/120kPa.

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