# Bypassing Morphological Instability of Lithium in The All-solid-state Battery Through Chemical Potential Differences in The 3D Current Collector

신동재, 김희탁†
한국과학기술원
(heetak.kim@kaist.ac.kr†)

Ceramic electrolytes are one of the most promising solid electrolytes because of their high thermal stability and ionic conductivity. Combined with lithium metal which has a high theoretical capacity and a low negative electrochemical potential, ceramic electrolytes are considered to realizing the high-energy-density battery. High mechanical properties such as the shear modulus of ceramic electrolytes have been considered to hinder the dendritic growth of lithium. However, it has been found that the dendritic growth of lithium still occurs inside the electrolytes. Moreover, the volume expansion of deposited lithium metal continuously stresses the ceramic electrolytes and degrades the cell operation. In this point of view, we show that by manipulating thermodynamic parameters, pressure, or temperature, the 3D current collector can encompass deposited lithium and bypass its morphological instability. These findings indicate that 3D current collectors can be a useful strategy to handle the issues of lithium metal deposition in the all-solid-state battery.