

論文 / 著書情報
Article / Book Information

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Title(English)	A Li ₂ S-based composite cathode with robust ion/electron-conducting structure for all-solid-state lithium-sulfur batteries
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種別(和文)	要約
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(博士課程)
Doctoral Program

論文要約

THESIS OUTLINE

系・コース : Department of, Graduate major in	応用化学 エネルギー	系 コース	申請学位 (専攻分野) : Academic Degree Requested	博士 Doctor of	(理学)
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論文題目 Thesis Title	A Li ₂ S-based composite cathode with robust ion/electron-conducting structure for all-solid-state lithium-sulfur batteries
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All-solid-state lithium-sulfur batteries offer high energy density, safety, and polysulfide suppression but are limited by the insulating nature of sulfur and Li₂S, and cathode volumetric changes during cycling. Here, a Li₂S-based composite cathode with enhanced ionic/electronic conductivity and stability is developed. The design includes (1) LiI modification by liquid-phase process, (2) infiltration of the Li₂S-LiI active material into a mesoporous carbon (~10 nm pores), (3) reduced particle size of cathode solid electrolyte by liquid-phase synthesis, and (4) addition of vapor-grown carbon fibers to form a three-dimensional conductive structure. This cathode achieves a high discharge capacity of 1009 mAh g⁻¹ at 0.05C and a reversible capacity of 650 mAh g⁻¹ after 100 cycles at 0.1C (298 K). Additionally, it supports an anode-free configuration for high-energy-density full cells. This study highlights the potential of robust three-dimensional mixed-conducting cathodes for advanced all-solid-state lithium-sulfur batteries.