

論文 / 著書情報
 Article / Book Information

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| 題目(和文) | |
| Title(English) | Material search and characterization of lithium conductors: Highly conductive Li ₁₀ GeP ₂ S ₁₂ -type Li-M-P-S-X-O phase (M = Si, Ge, Sn; X = F, Cl, Br, I) and electrochemically stable Li-P-S phase |
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| 出典(和文) | 学位:博士(理学), 学位授与機関:東京工業大学, 報告番号:甲第11903号, 授与年月日:2021年3月26日, 学位の種別:課程博士, 審査員:菅野 了次,平山 雅章,荒井 創,北村 房男,脇 慶子,中村 二郎 |
| Citation(English) | Degree:Doctor (Science), Conferring organization: Tokyo Institute of Technology, Report number:甲第11903号, Conferred date:2021/3/26, Degree Type:Course doctor, Examiner:,,,,, |
| 学位種別(和文) | 博士論文 |
| Category(English) | Doctoral Thesis |
| 種別(和文) | 要約 |
| Type(English) | Outline |

OUTLINE

In order to fabricate all-solid-state batteries with high power density and energy density, Li–Si–P–S based phases with $\text{Li}_{10}\text{GeP}_2\text{S}_{12}$ (LGPS)-type structure and high ionic conductivity and Li–P–S phases with a new crystal structure and high electrochemical stability were explored and characterized by diffraction and electrochemical measurements. A new solid solution of LGPS-type phase was obtained in the Li–Si–Ge–P–Br–O system. At $\text{Li}_{9.54}(\text{Si}_{0.6}\text{Ge}_{0.4})_{1.74}\text{P}_{1.44}\text{S}_{11.1}\text{Br}_{0.3}\text{O}_{0.6}$, bulk conductivity was estimated to be 37.4 mS cm^{-1} . For the Li–P–S system, a phase with a new crystal structure having layered PS_4 units and P_2S_7 units was obtained at the composition of $\text{Li}_{3.2}\text{PS}_4$. The cycle performance of solid-state-cell using the new $\text{Li}_{3.2}\text{PS}_4$ indicated a high electrochemical stability of this phase. The relationships between properties and compositions were clarified in the Li– M –P–S– X –O ($M = \text{Si, Ge, Sn}$; $X = \text{F, Cl, Br, I}$) and Li–P–S systems.