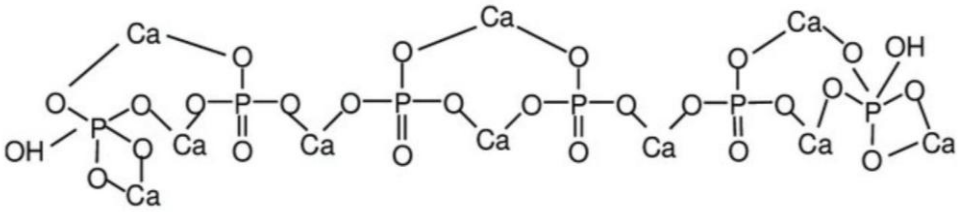
Tohoku Univ. Technology

New Lithium-ion conductor

Providing an inexpensive solid electrolyte that can be applied to solid-state batteries



chemical structural formula :
Hydroxyapatite ($Ca_{10}(PO_4)_6(OH)_2$)

Overview

The development of rechargeable batteries employing solid electrolytes has been actively pursued as a route toward safer and more reliable energy storage systems. Among the candidate materials, inorganic electrolytes such as sulfides, as well as polymer electrolytes, have attracted significant attention due to their high lithium-ion conductivity. Beyond ionic transport performance, extensive efforts have been devoted to improving safety, durability, and long-term stability for practical all-solid-state battery applications. Nevertheless, materials that fully satisfy industrial requirements have yet to be realized.

Through sustained research efforts, we have developed a new solid electrolyte material that simultaneously addresses lithium-ion conductivity and safety. This advance was achieved by introducing targeted modifications into hydroxyapatite-based materials. While conventional hydroxyapatite exhibits negligible lithium-ion conductivity, the modified material demonstrates a conductivity of approximately **1 mS/cm at room temperature**. This result establishes a new pathway toward safer and higher-performance all-solid-state batteries, with promising potential for applications in the automotive and robotics industries.

Lithium-ion conductivity

The modified hydroxyapatite developed in the present invention exhibits an ionic conductivity of **1 mS/cm or higher at room temperature**, indicating a performance level suitable for practical solid electrolyte applications.

Product Application

- All-solid-state lithium batteries
- Ion-conducting devices

Related Works

Small, 21, e06257, 2025, doi/full/10.1002/smll.202506257
Lab HP :
https://www.wpi-aimr.tohoku.ac.jp/~ej-cheng/Eric_web.htm

IP Data

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