Electrochemical Preparation of Metastable Semiconductor Allotropes

Initiative: "Experiment!" (beendet)

Ausschreibung: Explorative Phase

Bewilligung: 01.03.2021

Laufzeit: 1 Jahre 6 Monate

If it was possible to produce new forms of elemental silicon (Si) and germanium (Ge), promising candidates for direct band-gap semiconductors or battery-electrode materials would become available. Non-conventional low temperature preparation methods of intermetallic phases have provided access to a variety of metastable crystalline allotropes of Si and Ge. Although the methods have become increasingly elaborate, the preparation of the metastable allotropes on materials scale still remains hardly feasible. Neither the preparation of the sensitive precursors nor their conversion with the hitherto existing redox methods seem suitable for a production in larger amount and sufficient quality. But, an application beyond academic research is not feasible without suitably scalable and controllable preparation methods. This project aims at the development of a direct method for the transformation of diamond-type silicon and germanium into metastable allotropes by using single electrochemical conversion cycles.

Projektbeteiligte

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Open Access-Publikationen

Na2Ga7: A Zintl Wade Phase Related to -Tetragonal Boron
Type-II Clathrate Na24- Ge136 from a Redox-Preparation Route