

## **Nanostructured germanium formed by ion implantation method as an anode for lithium-ion batteries**

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Further wide commercialization of the lithium-ion batteries (LIB) technology is impossible without the development of an effective electrode systems and methods for their quick recharge. Currently, the possibility to use germanium (Ge) as an LIB anode is intensively studied due to theoretically much advanced characteristics for Ge compared to carbon [1]. However, internal stresses arising in such materials during cycling lead to the destruction of electrodes. To solve this problem, nanostructured germanium anodes of various configurations can be used.

Here we present the investigation of nanostructured germanium which consists of intertwining nanowires with a diameter of ~30 nm formed by the method of low-energy high-dose implantation of a single-crystal germanium substrate with silver ions [2]. Electrochemical properties study of the resulting material during its lithiation/delithiation process demonstrates a high reversible capacity (1080 mAh/g) and its retention of about 80% after 1000 cycles. The possible using the obtained material as an anode of a lithium-ion battery is discussed.

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[1] I.M. Gavrilin, Yu.O. Kudryashova et al., *Journal of Electroanalytical Chemistry* **2021**, 888, p. 115209.

[2] A.L. Stepanov, S.M. Khantimerov, et al., *Vacuum* **2021**, 194, p. 110552.