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Abstract zum Poster

Nanostructured Si wafers as anode materials for Li ion batteries*

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The development of a new generation of active materials for Li ion batteries with improved performance draws high attention due to the requirement of powerful energy storage devices necessary for the information-rich and mobile society. Among the intensely researched anodic materials for Li ion batteries, Si is in the focus because of its very high ability for energy storage. The main disadvantage of Si and Si based composites is the large volume expansion accompanying the process of Li insertion, inducing a rapid capacity fade and disintegration of the electrode [1]. In order to overcome this problem, Si can be applied in nano-structured form with the idea to improve the mechanical stability of the anode. The aim of the current study is to investigate the insertion - extraction of Li in different types of black Si electrodes. A further aim of our work is to test the electrochemical cyclability of the Si electrodes in non-flammable and environmentally friendly electrolytes. The black Si was fabricated by a self-masked reactive ion etching technique and the surface of the Si wafer was structured into nano-grass (Fig. 1a). The nano-grass samples displayed higher electrochemical activity than the flat Si reference samples with the same resistivity and structural orientation (Fig. 1b).

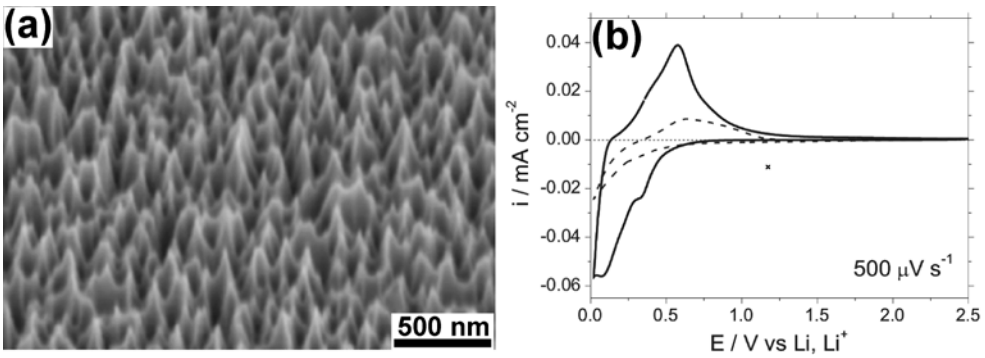

Fig. 1 (a) SEM image of the black Si surface (nano-grass), and (b) cyclic voltammetry of Si nano-grass (solid line) and corresponding Si reference sample (dashed line) measured in 1 M LiTFSI in the ionic liquid [BMP] [TFSI].

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