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Characterisation of Silicon Nanolayers Deposited by Plasma Enhanced Chemical Vapor Deposition on 3-D ZnO Templates for Hollow Silicon Microstructures

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Hollow inorganic microstructures have gained much interest in nowadays research fields as they offer unique properties (high specific area, thermal conductivity or density) when compared to their bulk equivalents [1]. On the other hand, for many applications, e.g. as anode material in lithium ion batteries [2], crystalline silicon microstructures (c-Si) would be of great interest. The development of thin hollow Si microparticles based on t-ZnO would therefore offer a new class of Si structures which are of special interest as they combine suitable physico-chemical properties with high porosity caused by their special morphology. One approach for the realization of these Si microstructures includes the usage of plasma enhanced chemical vapor deposition based on argon diluted silane source gases as it provides the opportunity to fabricate homogeneous nanolayers at relatively low temperatures. In order to obtain the desired morphology combined with an adequate deposition rate, in this work the process was optimized by parameter variations and subsequent investigations of the films by Raman spectroscopy, scanning electron microscopy and profilometry. First experiments for the deposition of Si onto t-ZnO were implemented and promising results were obtained.