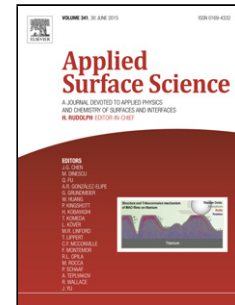


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Investigation of Functionalized Silicon Nanowires by Self-Assembled Monolayer

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Abstract

The functionalization using self assembled monolayer (SAM) of silicon nanowires (SiNW) fabricated by plasma enhanced chemical vapor deposition (PECVD) is reported here. The SAM is being utilized as the first building block in the functionalization process. The morphology of the SiNW comprises a polycrystalline core wrapped by an hydrogenated amorphous silicon (α -Si:H) shell. Since most of the available methods for SAM verification and characterization are suitable only for flat substrates; therefore, in addition to the SiNW α -Si:H on flat samples were produced in the same system as the SiNWs. First we confirmed the SAM's presence on the flat α -Si:H samples using the following methods: contact angle measurement to determine the change in surface energy; atomic force microscopy (AFM) to determine uniformity and molecular coverage. Spectroscopic ellipsometry and X-ray reflectivity (XRR) were performed to measure SAM layer thickness and density. X-ray photoelectron spectroscopy (XPS) was applied to study the chemical states of the surface. Next, SiNW/SAM were tested by electrochemical impedance spectroscopy (EIS), and the results were compared to α -Si:H/SAM. The SAM electrical coverage on SiNW and α -Si:H was found to be ~37% and ~65±3%, respectively. A model,

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