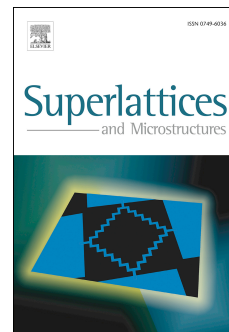


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## Fabrication of a High Sensitivity and Fast Response Self-Powered Photosensor Based on a Core-Shell Silicon Nanowire Homo Junction

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### Abstract

Core-shell self-powered SiNWs homo junction photosensors have been fabricated. SiNWs are prepared by a metal assisted chemical etching method using different HF/H<sub>2</sub>O<sub>2</sub> ratios and etching times. The length of the p-SiNWs increased as the H<sub>2</sub>O<sub>2</sub> concentration and etching time increased. All the grown SiNWs show very low (~0.7%) optical reflectance for the wavelength range of 200-1100nm. Photoluminescence spectra of all prepared SiNWs show sharp and broad emission bands located in the red region of the light spectrum. Core-shell homo junction photosensors were fabricated by spin coating P<sub>2</sub>O<sub>5</sub> onto the surface of the prepared p-SiNWs and annealed at 900°C for 1h. The fabricated devices exhibited photovoltaic behavior and high photosensitivity with fast response speed to the visible light. However, the sample that was fabricated using HF/H<sub>2</sub>O<sub>2</sub> ratio of 1:1 showed the highest photosensitivity value of 3578% while the photosensor prepared using 2:1 ratio of HF/H<sub>2</sub>O<sub>2</sub> gave the faster rise and decay time.

**Keywords:** SiNWs, core-shell, photosensor, self-powered, homo junction

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