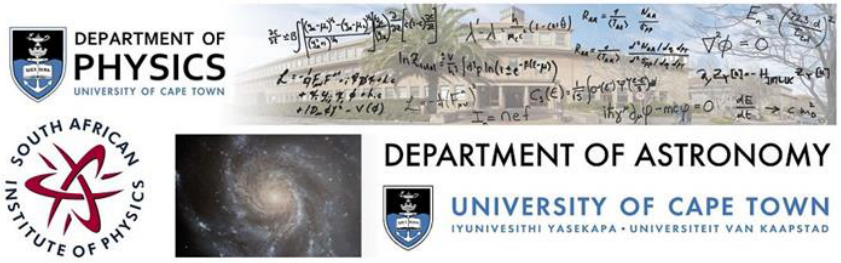

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Optical and electronic properties of silicon nanowires fabricated by Metal Assisted Chemical Ecthing

Wednesday, 6 July 2016 11:30 (20 minutes)

Abstract content
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Silicon nanowires are promising materials for use in low cost solar cell applications due to their high surface area, efficient light trapping and high carrier mobilities. In this paper, we report on the fabrication of silicon nanowires using the metal assisted chemical etching method for different etching durations and the doping of these intrinsic Si NWs with POCl3. Scanning electron microscopy revealed the correlation between the etching time and the morphological properties such as length of the as-grown Si NWs. The Si NWs were found to have diameters ranging from about 80 nm to 200 nm and their lengths ranging from about 1 μm to 4 μm. High resolution transmission electron microscopy investigation showed that the SiNWs had a crystalline core and amorphous silicon oxide shell structure with some Si nanocrystals embedded in it. The doped Si NWs exhibited very strong photoluminescence bands, namely the blue and yellow-orange emission bands which were attributed to the formation of Si nanocrystals embedded in a SiO2 matrix and some structural defects. The UV-Vis specular reflection measurements conducted on the Si NWs displayed enhanced anti-reflective properties with reflection dropping below 2 %. Hall-effect measurements also showed improved conductivity of the doped Si NWs compared to the intrinsic Si NWs.

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