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Transport properties of Sb doped Si nanowires PRATHYUSHA NUKALA, GOPAL SAPKOTA, PRADEEP GALI, PHILIPOSE USHA, University of North Texas, USHA PHILIPOSE TEAM — n-type Si nanowires were synthesized at ambient pressure using SiCl_4 as Si source and Sb source as the dopant. Sb doping of 3-4 wt % was achieved through a post growth diffusion technique. The nanowires were found to have an amorphous oxide shell that developed post-growth; the thickness of the shell is estimated to be about 3-4 nm. The composition of the amorphous shell covering the crystalline Si core was determined by Raman spectroscopy, with evidence that the shell was an amorphous oxide layer. Optical characterization of the as-grown nanowires showed green emission, attributed to the presence of the oxide shell covering the Si nanowire core. Etching of the oxide shell was found to decrease the intensity of this green emission. A single undoped Si nanowire contacted in an FET type configuration was found to be p-type with channel mobility of $20 \text{ cm}^2\text{V}^{-1}\text{S}^{-1}$. Sb doped Si nanowires exhibited n-type behavior, compensating for the holes in the undoped nanowire. The doped nanowires had carrier mobility and concentration of $160 \text{ cm}^2\text{V}^{-1}\text{S}^{-1}$ and $9.6 \times 10^{18}\text{cm}^{-3}$ respectively.

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