Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Selective Fractionation of Nanowire Diameter by Centrifugation[1]

T.E. TRAMMELL, K.W. ADU, H.R. GUTIÉRREZ, Q. XIONG, E.C. DICKEY, P.C. EKLUND, Pennsylvania State University, University Park, PA 16802 USA —

Small diameter semiconductor nanowires are excellent candidates for a new generation of optoelectronic devices. Many batch processes can produce a large amount of nanowires, but with a very wide diameter distribution. In this work, we show how centrifugation can be used in producing distinct diameter fractions from the as-grown diameter distribution. This separation technique was applied to wires of four different semiconductor materials (Si, Ge, GaP, ZnS). We observed that the mean diameter distribution of a given fraction systematically shifts to smaller nanowire diameters with increasing centrifugation time. Based on the classic equations of motion of particles in fluids, we have calculated the influence of different parameters such as solvent viscosity, nanowire material density, centrifugation time and speed on the final diameter distribution. This simple model will be shown to be a useful instrument for the selection of optimal centrifugation conditions for separating many distinct diameter fractions from a grown material.

[1]Work supported by the NSF NIRT program (DMR- 0304178).

G. Chen

Date submitted: 08 Dec 2004 Electronic form version 1.4