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Growth and optical properties of GaAs-GaInP core-shell nanowires N. SKOLD, M.-E. PISTOL, J. TRAGARDH, L. SAMUELSON, Solid State Physics, Lund University, Sweden, M. LARSSON, Materials Chemistry, Lund University, Sweden — Nanowires are potentially interesting as ideal systems for 1D-transport of charge and excitons. They may also serve as waveguides for light. Adding a large band gap shell to a nanowire can improve several properties. The shell reduces the effect of surface states, enhances emission efficiency and improves the cavity properties of the nanowire. If the shell is grown lattice-mismatched to the core, elastic strain induced in the core offers flexibility in band structure engineering. We have synthesized GaAs-$Ga_xIn_{1-x}P$ core-shell nanowires by metal-organic vapor phase epitaxy in order to study such phenomena. The nanowire core was grown in the vapor-liquid-solid growth mode, size controlled by, and seeded from, Au aerosol particles. The core was grown at a low temperature where almost no growth takes place on the side facets. The shell was grown at a higher temperature where the kinetic hindrance of the side facet growth can be overcome. Photoluminescence measurements on individual nanowires (at 5 K) show enhanced emission efficiency from the core compared to uncapped samples. Luminescence from the shell indicates alloy ordering. Strain induced in the core by lattice-mismatched shells was studied and confirmed by deformation potential calculations. Time-resolved measurements will also be presented.

Niklas Skold
Lund University

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