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Measurements of the bandgap of wurtzite $InAs_{1-x}P_x$ nanowires using photocurrent spectroscopy J TRAGARDH, A.I. PERSSON, Solid State Physics, Lund University, Sweden, J.B. WAGNER, Polymer and material chemistry, Lund University, Sweden, D. HESSMAN, L. SAMUELSON, Solid State Physics, Lund University, Sweden — We report measurements of the bandgap of $InAs_{1-x}P_x$ nanowires with wurtzite crystal structure as a function of the composition. The bandgap was measured using photocurrent spectroscopy (performed at 5 K) on single InAs nanowires with a centrally placed $InAs_{1-x}P_x$ segment, contacted at the InAs ends. The nanowires were grown with chemical beam epitaxy (CBE). The measured bandgap was larger than the bandgap of zincblende $InAs_{1-x}P_x$ by about 120 meV over the measured composition range, $0.15 < x < 0.5$. We attribute this increase to the to the fact that the crystal structure is wurtzite rather than zincblende. These measurements, combined with our previous measurements of the development of the conduction band off-set with composition [1] as determined by thermal activation measurements, allow us to determine the evolution of both the conduction and valence band off-sets with the $InAs_{1-x}P_x$ composition. [1] Persson et al. Nano Letters 6, 403 (2006)

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