Abstract Submitted
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Correlating the nanostructure and electronic properties of InAs nanowires M. D. SCHROER, J. R. PETTA, Princeton University — III-V nanowires have many attractive electrical properties, but only recently has control over the planar defect density been achieved. We correlate the nanowire defect structure with electronic properties by growing InAs nanowires with a growth temperature tunable defect density in a home-built MOVPE reactor[1]. Multiple field effect transistors (FETs) were fabricated along the length of these nanowires to allow the measurement of field-effect mobility as a function of defect density[2]. Nominally defect-free segments have a 4.2 K mobility up to $\sim$4$\times$ higher than defect-rich segments on the same nanowire and approach μ=16,000-18,000 cm^2/V s, comparable to values reported for InAs/InP core shell FETs[3]. At low temperatures, the presence of these defects leads to the accidental formation of quantum dots along the length of the wire. These results suggest that control of the rotational twinning defect density in InAs nanowires will be of crucial importance in order to allow the fabrication of locally gated nanowire quantum dots.
References:
[1] M. D. Schroer, S. Y. Xu, A. Bergman and J. R. Petta, arXiv:0911.0845v1
[2] M. D. Schroer and J. R. Petta, (in preparation)
[3] X. Jiang, Q. Xiong, S. Nam, F. Qian, Y. Li and C. M. Lieber, *Nano Lett.* **7**, 3214 (2007)

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