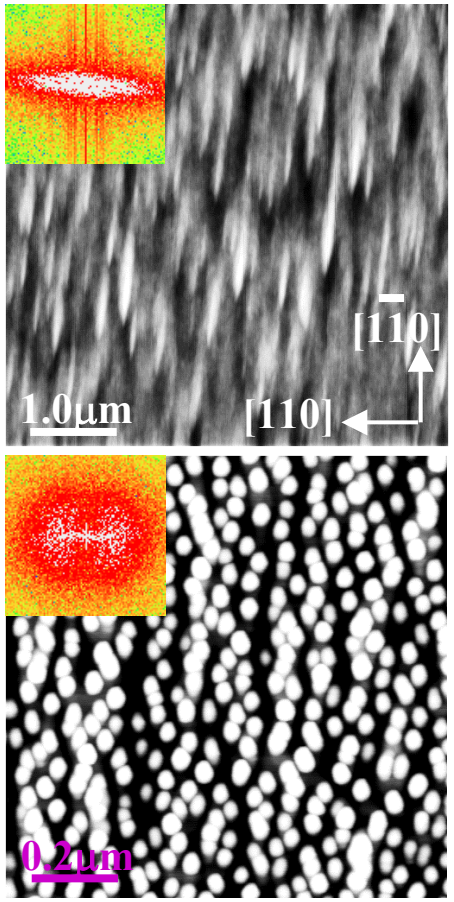
Role of Elastic Anisotropy in Semiconductor Nanopatterning

Rachel S. Goldman, University of Michigan, DMR-0210714

Semiconductor nanopatterning via self-assembly has shown significant promise for a wide range of electronic and optoelectronic applications. To date, 1D and 2D non-lithographic nanopatterned arrays have been achieved via stacking of self-assembled quantum dot superlattices. We are exploring the role of elastic anisotropy on 3D semiconductor nanopatterning. To date, we have examined the effects of different buffer layer growth T, and annealing sequences on the patterning of Quantum Dots (QDs). The alignment of QDs along [-110] directions is enhanced by buffers grown and/or annealed at ~500C. This provides a simple method for controlling QD spacing and position, towards 3D semiconductor nanopatterning.



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Education:

Seven undergraduates (Ellen Burgunder, Dan Dettling, Scott Hanson, Molly Hegarty, Rachel Matthews, Blake Nickles, Georgette Obeidi, Meghan Pocs, and Nick Rudawski) and four graduate students (Vaishno Dasika, Matt Reason, Xiaojun Weng, and Weifeng Ye) contributed to this work. Undergraduates Nickles and Rudawski were recently selected as Finalist for the 2003-2004 Intel Research Contest for Undergraduate Students. Weng received his Ph.D. in January 2003 and is presently a postdoc at UM.

Outreach:

Several juniors and seniors from high schools throughout North America spent six weeks doing research at UM. The program aims to establish working relationships between H.S. students and active researchers in science-oriented fields and to strengthen and retain student interest in science and engineering careers, especially among students from groups underrepresented in these fields.

Sarah Benatar and Andy Mansfield worked with the Goldman Group during the Summer of 2003