Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Block copolymer lithography for growth of wide band gap nanostructures: Process control and optimization KASIRAMAN KRISHNAN, AZAR ALIZADEH, OLIVER BOOMHOVER, KENNETH CONWAY, LAURAINE DENAULT, DAVID HAYS, CHRISTOPHER KEIMEL, ROSALYN NEANDER, SETH TAYLOR, GE Global Research, ANDREAS STINTZ, JAY BROWN, SANJAY KRISHNA, University of New Mexico, EDIT BRAUNSTEIN, COLIN JONES, Lockheed Martin, GE GLOBAL RESEARCH TEAM, UNIVERSITY OF NEW MEXICO COLLABORATION, LOCKHEED MARTIN TEAM — Block copolymer lithography offers a promising route for fabricating wide band gap semiconductor quantum dots. A PS-PMMA block copolymer is self-assembled over a random copolymer brush to allow for perpendicular orientation of PMMA cylinders. The substrate consists of GaAs, SiO_2 and the brush layer. The block copolymer pattern is transferred to the SiO_2 by reactive ion etching. In the next step, growth of InAs quantum dots in the holes of the template is achieved by MBE. The quantum dots are further characterized by TEM and photoluminescence. The copolymer molecular weight is a critical parameter in determining density and size of the dots. Although use of lower molecular weight polymers can result in higher density of dots, it also leads to more processing challenges. We demonstrate the process optimizations involved in templating with lower molecular weight polymers, and in particular address the challenges in RIE.

Kasiraman Krishnan
GE Global Research

Date submitted: 03 Dec 2006 Electronic form version 1.4