Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Suppression of Dewetting in Polystyrene Thin Films by Polymer Nanoparticles HONGXIA FENG, R. M. BRIBER, Department of Materials Science and Eng., University of Maryland, VICTOR Y. LEE, ROBERT D. MILLER, HO-CHEOL KIM, IBM Almaden Research Center, 650 Harry Road, San Jose CA 95120-6099 — The addition of a small amount of polymer nanoparticles (based on star polymers) to linear polystyrene (PS) can lead to inhibition of dewetting in thin (30 nm) spun-cast films. The star polymers have polystyrene-benzocyclobutene random copolymer arms which can undergo *intra*-molecular crosslinking to form compact nanoparticles. Differences in the dewetting behavior between films containing the uncrosslinked and crosslinked star polymers suggests that the system has tunable dewetting behavior, depending on the specifics of the added star molecules. The suppression of dewetting may be related to a segregation layer of nanoparticles at the polymer/silicon interface as observed by neutron reflectivity (NR) in as-cast nanoparticle-containing films. Small angle neutron scattering data shows the nanoparticles are miscible with the PS, implying that the segregation is not due to bulk phase separation. Characterization of the hole morphology in the films by atomic force microscopy indicates there is a layer of nanoparticles left behind on the Si substrate inside the hole, which should be related to the segregation layer observed by NR.

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Date submitted: 15 Dec 2004 Electronic form version 1.4