Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Weak interfaces for UV cure nanoimprint lithography FRANCES HOULE, ANN FORNOF, IBM Almaden Research Center, EVA SIMONYI, IBM TJ Watson Research Center, DOLORES MILLER, HOA TRUONG, IBM Almaden Research Center — Nanoimprint lithography using a photocurable organic resist provides a means of patterning substrates with a spatial resolution in the few nm range. The usefulness of the technique is limited by defect generation during template removal, which involves fracture at the interface between the template and the newly cured polymer. Although it is critical to have the lowest possible interfacial fracture toughness (Gc less than 0.1 Jm-2) to avoid cohesive failure in the polymer, there is little understanding on how to achieve this using reacting low viscosity resist fluids. Studies of debonding of a series of free-radical cured polyhedral silsesquioxane crosslinker formulations containing selected reactive diluents from fluorosilane-coated quartz template materials will be described. At constant diluent fraction the storage modulus of cured resists follows trends in initial reaction rate, not diluent Tg. Adhesion is uncorrelated with both Tg and storage modulus. XPS studies of near-interface compositions indicate that component segregation within the resist fluid on contact with the template, prior to cure, plays a significant role in controlling the fracture process.

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Date submitted: 26 Nov 2007 Electronic form version 1.4