Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Surface Tension Driven Laser Lithography of Thin Polymer Films

JOHN M. HUDSON, MICHAEL V. MASSA, KARI DALNOKI-VERESS, JOHN S. PRESTON, AN-CHANG SHI, Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada — We have developed a technique for the non-destructive laser lithography of supported polymer films. Using a focused laser beam we induce a sharp thermal gradient within the film, which leads to a variation in surface tension across the free surface. As a result of the gradient in the surface tension, material flows away from the center of the beam via the thermo-capillary effect. This non-destructive process can be used to rapidly write trenches and patterns in polymer films, with fine control over the spatial dimensions and features (width, depth, etc.). The experimental results will be discussed in the context of a linearised model which predicts the topography of the feature as a function of experimental parameters.

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Date submitted: 21 Mar 2013 Electronic form version 1.4