Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Sub-diffraction limited features in three-dimensional photopatterned, two-photon excimer-forming fluorescent dye-doped films CHRISTOPHER RYAN, BRENT VALLE, JOSEPH LOTT, JACK R. JOHNSON, JIE SHAN, KENNETH D. SINGER, Case Western Reserve University, CHRISTOPH WEDER, University of Fribourg, DAVID A. SCHIRALDI, Case Western Reserve University — 3D Photopatterning is a key process in optical data storage, photolithography and other applications. Two photon active systems are a popular choice to pattern in 3D. The main challenges pertain to the contrast and density of the patterned features. By making use of a thermal threshold process which induces dye deaggregation, high contrast features are written with diameters smaller than the system's diffraction limit. A polymer film was doped with a two photon active dye that possesses two distinct fluorescence states in its monomer and excimer phases. The film's phases are stable at room temperature, and have a threshold response to heating. By selective exposure to a pulsed 675 nm source, the film is photopatterned in 3D as the focused pulses are absorbed and thus anneal the sample. Because the change is physical rather than chemical, the mechanism is shown to be a threshold process. As a result, sub diffraction limit photopatterns are demonstrated in the medium.

Brent Valle
Case Western Reserve University

Date submitted: 07 Dec 2010 Electronic form version 1.4