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Vapor deposited organic thin films with large third order nonlinearities for integrated nonlinear optics BWEH ESEMBESON, JOSHUA C. MAY, IVAN BIAGGIO, Department of Physics and Center for Optical Technologies, Lehigh University, TSUYOSHI MICHINOBU, FRANÇOIS DIEDERICH, Laboratorium für Organische Chemie, ETH-Hönggerberg — We used vapor deposition in high vacuum to fabricate homogenous organic thin films for third-order nonlinear optics. We used small molecules that have a high third order polarizability, are robust, and can be sublimated without decomposition. The most important example is 1,1,2-tricyano-2-[(4-dimethylaminophenyl)ethynyl]ethene (TDMEE), which has a *specific* third order polarizability one order of magnitude larger than other highly nonlinear molecules. It is a member of a family of donor-substituted cyanoethynylethene molecules that has recently been found to have polarizabilities that approach Kuzyk's fundamental limit.[1] The organic thin films have a high, flat transmission above 1000 nm, a high two-photon absorption near 1200 nm, and an essentially real third order polarizability at 1.5 μm that is three orders of magnitude larger than fused silica.

[1]J. C. May et al, Opt. Lett. 30, 3057 (2005)

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