

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Probing Photoconductivity in Phthalocyanines by Terahertz Spectroscopy CHEN XIA, BRIAN KUBERA, VOLODIMYR DUZHKO, HEFEI SHI, KENNETH SINGER, JIE SHAN, Department of Physics, Case Western Reserve University — Liquid crystals (LCs) are a relatively new class of photoconductors. Surprisingly high carrier mobilities have lately been reported in LCs. Although the high molecular order in these systems has been recognized to play an essential role in the high carrier mobilities, the mechanism of charge transport and carrier photogeneration are still not well understood. In this work, we investigate phthalocyanine (Pc) derivatives belonging to a family of discotic LCs as a model system. Optical pump/terahertz probe spectroscopy was employed to measure frequency dependence of the photoconductivity in Pc from 0.2 to 2.5THz. Photoconductivity appears within ~ 1 ps (limited by time resolution of setup) after photoexcitation. It is followed by a fast decay of a few ps and a slow decay of 10's ps. Distinct frequency dependences were observed in the polycrystalline and liquid crystalline phases. The mechanism of charge transport and free carrier generation and recombination in the material will be discussed.

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Date submitted: 27 Nov 2007

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