Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Ultrafast Optical Studies of Carrier Relaxation Dynamics in PbSe Nanoplatelets ANDREW FIDLER, WEON-KYU KOH, CLAUDIU CIRLOGANU, NIKOLAY MAKAROV, ISTVAN ROBEL, VICTOR KLIMOV, Los Alamos National Lab — Two-dimensional materials have attracted widespread interest due to their unique electrical, optical, and mechanical properties. Most of the two-dimensional materials currently available have a layered crystal structure, allowing for the efficient mechanical cleavage of bulk materials to isolate individual monolayers. The synthesis of new classes of two-dimensional materials with non-layered crystal structures remains challenging. Here we present optical studies of an emerging class of two dimensional materials, a colloidal suspension of thin lead selenide nanoplalets. Due to the large Bohr radius of lead selenide ($\sim$ 46 nm), our nanoplatles of size 30 x 30 x 2 nm exhibit the effects of quantum confinement in all three dimensions. Using transient absorption and time resolved photoluminescence measurements we characterize the dominant relaxation pathways to explore how asymmetric confinement influences the carrier dynamics. Potential applications of lead selenide nanostructures arising from their small bandgap, such as infrared detectors as well as photovolatics are discussed.

Andrew Fidler
Los Alamos National Lab

Date submitted: 14 Nov 2013 Electronic form version 1.4