Abstract Submitted
for the OSS15 Meeting of
The American Physical Society

PbS Nanosheets 2D attachement ZHOUFENG JIANG, GHADENDRA BHANDARI, DOUGLAS DIMICK, LIANGFENG SUN, Bowling Green State University — Lead sulfide (PbS) is an important material for optoelectronic devices due to its small and direct energy gaps, small carrier effective masses and high charge mobilities. Making two-dimensional (2D) PbS results in novel properties which may find applications in valleytronics, low-dissipation electronics, and topological insulators. To explore these novel properties, emerging wet-chemistry syntheses have been adapted to make colloidal 2D PbS nanosheets (NSs). It provides an alternative route to the traditional epitaxial methods while making flexible, free-standing NSs. However, the growth mechanism of the PbS NSs is not well-understood yet. In our lab, a photoluminescence spectroscopy method has been developed to characterize the NSs at different growth stages. An intensity-decreasing photoluminescence peak at short wavelength was observed, together with an intensity-increasing, red-shifting peak at long wavelength. These double peaks reveal the decrease of the nanocrystals and the increase of the NSs during the reaction, where the NSs are formed through the 2D attachments of the nanocrystals, which is consistent with the measurements using transmission electron microscopy. The unique feature in the photoluminescence spectra can be used to monitor the growth of the NSs *in situ.*

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Date submitted: 06 Mar 2015 Electronic form version 1.4