Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Structural and optical properties of 2-dimensional magnetic semiconductor CrPS4 CHANGGU LEE, JINHWAN LEE, Sungkyunkwan University, TAEG YEONG KO, Pohang University of Science and Technology, JUNG HWA KIM, ZONGHOON LEE, Ulsan National Institute of Science and Technology, SUNMIN RYU, Pohang University of Science and Technology, BYUNGGIL KANG, HUNYOUNG BARK, Sungkyunkwan University — Atomically thin 2-dimensional semiconducting metal chalcogenides exhibit diverse physical properties depending on their thickness. However, the lack of magnetism in these materials limited their expansion in more immense exploration of their properties and applications. In this work, we report the structural and optical properties of atomically thin chromium thio-phosphate (CrPS4), which is a magnetic semiconductor. By using polarized light, we could find strong anisotropy in its structure with 180 degree period. Comparison with the transmission electron microscopy observation of lattice structure enables us to easily identify the crystalline orientation of the layered structure. The thickness of crystals exfoliated down to monolayer could be further identified through Raman and photoluminescence (PL) spectroscopies. Thickness dependence of positions and intensities of Raman shift peaks were observed depending on the excitation wavelength. The PL spectroscopy and electronic transport measurement results showed its p-type semiconducting behavior with 1.35 eV of electronic bandgap.

Changgu Lee
Sungkyunkwan University

Date submitted: 02 Nov 2016 Electronic form version 1.4