Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Strong in-plane anisotropic optical properties of monolayer, few-layer and bulk $ReSe_2$[1] HUAN ZHAO, Univ of Southern California, QIUSHI GUO, Yale University, LUHAO WANG, Univ of Southern California, FENGNIAN XIA, Yale University, HAN WANG, Univ of Southern California — Recently, there has been growing interest in the anisotropic properties of certain two-dimensional (2D) materials with reduced lattice symmetry, such as black phosphorus, for developing novel applications in nanoelectronics and infrared optoelectronics. In this work, we report the strong anisotropic optical and electronic properties of monolayer, few-layer and bulk $ReSe_2$, an emerging member of the 2D transition metal dichalcogenides (TMDCs) family. With its bulk bandgap around 1.1 eV and potentially tunable with layer number and strain, $ReSe_2$ may complement black phosphorus for optoelectronic applications utilizing its anisotropic properties in the near-infrared and visible range. Through careful investigations of the polarization-resolved Raman spectroscopy, photoluminescence (PL), polarization-resolved optical extinction spectrum, angle-resolved DC conductance and first principles calculations, we observed and explained the consistent dependence of phonon, optical and electrical properties of $ReSe_2$ on its in-plane crystal orientation. Our results reveal the interesting anisotropic properties of 2D $ReSe_2$ and shed light on its potential applications in electronics and optoelectronics.

[1]This work was supported by the Army Research Laboratory.

Huan Zhao
Univ of Southern California

Date submitted: 13 Nov 2014 Electronic form version 1.4