Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Optical nano-imaging of waveguide exciton polaritons in transition-metal dichalcogenides ZHE FEI, Iowa State University, MARIE SCOTT, University of Washington, DAVID GOSZTOLA, Argonne National Laboratory, JONATHAN FOLEY, William Paterson University, JIAQIANG YAN, DAVID MANDRUS, Oak Ridge National Laboratory, HAIDAN WEN, Argonne National Laboratory, PENG ZHOU, DAVID ZHANG, Fudan university, YUGANG SUN, JEFFREY GUEST, STEPHEN GRAY, Argonne National Laboratory, WEN-ZHONG BAO, Fudan university, GARY WIEDERRECHT, Argonne National Laboratory, XIAODONG XU, University of Washington — Exciton polaritons, which are collective oscillations of photons and excitons in semiconductors, trigger tremendous research interests in both fundamental physics and technological applications. Previous studies retain to spectroscopic studies of exciton polaritons confined in microcavities. Here, we report on optical nano-imaging study of waveguide exciton polaritons of thin flakes of transition-metal dichalcogenides (TMDCs) using the near-field scanning optical microscopy. The observed polaritons are formed by strong coupling between waveguide photons and A excitons in TMDCs. The wavelength of these exciton polaritons can reach as low as 300 nm. By tuning the laser frequency, we are able to map the entire polariton dispersion both above and below the A exciton energy. Further analysis indicates that polaritons in the lower-energy branch have a propagation length over many microns while the modes in the upper-energy branch are strongly damped due to the Landau damping.

Zhe Fei
Iowa State University

Date submitted: 01 Dec 2015 Electronic form version 1.4