

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Probing the intrinsic optical quality of CVD grown MoS₂¹ AMINA ZAFAR, HAIYAN NAN, ZAINAB ZAFAR, YUMENG YOU, ZHENHUA NI, Southeast University — Optical emission efficiency of two-dimensional layered transition metal dichalcogenides (TMDs) is one of the most important parameters affecting their optoelectronic performance. The optimization of the growth parameters by chemical vapor deposition (CVD) to achieve optoelectronic-grade quality TMDs is, therefore, highly desirable. Here, we present a systematic photoluminescence (PL) spectroscopic approach to assess the intrinsic optical and crystalline quality of CVD grown MoS₂ (CVD MoS₂). We propose the use of the intensity ratio between the PL measured in air and vacuum as an effective way to monitor the intrinsic optical quality of CVD MoS₂. Low-temperature PL measurements are also used to evaluate the structural defects in MoS₂, via defect-associated bound exciton emission, which well correlates with the field-effect carrier mobility of MoS₂ grown at different temperatures. This work therefore provides a sensitive, noninvasive method to characterize the optical properties of TMDs, allowing the tuning of the growth parameters for the development of optoelectronic devices.

¹Southeast University

Amina Zafar
Southeast University

Date submitted: 07 Nov 2016

Electronic form version 1.4