Abstract Submitted
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Modifying the Photoluminescence of Monolayer MoS2 by Metal Deposition DEZHENG SUN, Columbia University and University of California, Riverside, YUMENG YOU, KIN FAI MAK, FAN ZHANG, JAMES HONE, Columbia University, LUDWIG BARTELS, University of California, Riverside, TONY HEINZ, Columbia University — Monolayer MoS2 exhibits strong photoluminescence (PL) due to its direct band gap located at K point. Because of its monolayer thickness, light emission from MoS2 is known to be strongly influenced by interactions with surrounding media [1]. In this study, we have investigated the effect on the photoluminescence of exfoliated monolayers of MoS2 induced by the deposition of gold atoms. The PL from the sample was recorded as a function of amount of gold deposited, up to an effective thickness of about 1 nm. Atomic force microscopy revealed that the gold forms isolated island structures on the surface. A progressive increase in quenching was seen with increasing gold coverage. Deposition of gold on suspended MoS2 samples led to quenching of the PL by more than a factor of 100. Given the low reactivity of gold, we attribute the PL quenching primarily to energy transfer of the photogenerated excitons to the metal clusters. The observed changes in the shape and intensity of emission spectra will be discussed in terms of this mechanism and possible effects of doping induced by the gold deposition.

[1] K. F. Mak, C. Lee, J. Hone, J. Shan and T. F. Heinz, PHYSICAL REVIEW LETTERS, 105, 136805 (2010),

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