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Electronic structure studies of MX_2(M=Mo, W; X=S, Se) by ARPES and the band evolution of hydrogen gas exposed MoS_2 BEOM SEO KIM, SOOHYUN CHO, BEOMYOUNG KIM, Yonsei Univ, JONATHAN DENLINGER, Advanced Light Source, BYUNG HOON KIM, SEUNG RYONG PARK, Incheon National Univ, CHANGYOUNG KIM, Yonsei Univ — The physics associated with transition metal dichalcogenides (TMDCs) is one of the most intriguing issues in condensed matter physics. These materials have several interesting aspects inter physical properties, especially the direct to indirect band gap transition and spin-orbit coupling induced spin band splitting at the K-point. However, thorough systematic studies on the electronic structures of TMDCs regarding those issues have not been done. We present the electronic structure studies of MX_2 using angle resolved photoemission spectroscopy(ARPES). We investigated the indirect band gap and spin-band splitting sizes of MX_2. In addition, we present ARPES results from MoS_2+H_2(10h), performed to investigate the evolution of the band structure as a function of hydrogen exposure (from MoS_2 to MoS_2+H_2(10h)). Photon energy dependence and potassium dosing were performed for each system. The results from MX_2 are quite consistent with the published band calculation results. In the MoS_2+H_2 (10h) case, there are two interesting observations from the results. The first is that the indirect band gap size decreases upon exposure to hydrogen. The other observation is that the Γ band appears to have quantum confinement effect.

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