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An ARPES investigation of band evolution of MoS_2 in presence of high pressure hydrogen gas[1] SOOHYUN CHO, Yonsei University, BEOM SEO KIM, Seoul National University, BEOM YOUNG KIM, YEONGKWAN KIM, Lawrence Berkeley National Laboratory, BYUNG HOON KIM, Incheon National University, CHANGYONG KIM, Seoul National University, SEUNGRYONG PARK, Incheon National University, INCHEON NATIONAL UNIVERSITY COLLABORATION, LAWRENCE BERKELEY NATIONAL LABORATORY COLLABORATION — The monolayer MoS_2, has a large direct band gap and spin band splitting in K-point which make it a good candidate for several applications such as solar cell, valley Hall transistor and so on. When it has more than two layers, turns into a semiconductor with indirect band gap. Theoretical predictions have revealed that the number of layers is directly related to number of bands. Also, it was recently reported that the resistivity of MoS_2 decreases when exposed to high pressure hydrogen gas for few hours. To investigate the evolution of energy bands as a function of high pressure hydrogen exposure, we performed angle resolved photoemission spectroscopy (ARPES) experiment on pristine and hydrogen treated bulk MoS_2. Our result, is suggestive for quantum well state in the treated sample case, and impurity state induced by sulphur vacancy between valence and conduction band at K-point. We argue that the impurity state depending on momentum mediate decrease in resistivity.

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