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Possible electric field induced indirect to direct band gap transition in $MoSe_2$ BEOM SEO KIM, Seoul Natl Univ, WONSHIK KYUNG, Lawrence Berkeley National Laboratory, JEONGJIN SEO, Yonsei Univ, JUNYOUNG KWON, CHANGYOUNG KIM, Seoul Natl Univ, SEUNG RYONG PARK, Incheon Natl Univ — Novel phenomena such as indirect to direct band gap transition, spin-valley-layer locking and polarization dependent valley control are attractive features of transition metal dichalcogenides (TMDs). Here, we report the possibility for electric field induced indirect to direct band gap transition in bulk $MoSe_2$ observed by using angle resolved photoemission spectroscopy (ARPES). In order to demonstrate the evolution of the electronic structure as a function of surface electron doping and/or surface electric field, we use *in-situ* alkali metal dosing on the surface of *in-situ* cleaved $MoSe_2$. We find that the alkali metal evaporation affects the Γ and the K point electronic structure differently. The difference in binding energy between valence band maximum (VBM) at the Γ and the K points changes from 370 meV to 30 meV. Our results not only clearly show a possibility of indirect to direct band gap transition by electric field, but also show the relation between the gap size and surface electric field in semiconductor.

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