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Photocurrent Switching of Monolayer MoS₂ using Metal-Insulator Transition JIN HEE LEE, CINAP, IBS, DOES, SKKU, HAMZA ZAD GUL, HYUN KIM, CINAP, IBS, DOES,SKKU., BYOUNG HEE MOON, Center for Integrated Nanostructure Physics, Institute for Basic Science (IBS), SUBASH ADHIKARI, JUNG HO KIM, HOMIN CHOI, YOUNG HEE LEE, SEONG CHU LIM, CINAP, IBS, DOES,SKKU. — We achieve photocurrent switching of monolayer molybdenum disulfide (MoS₂) by controlling the metal–insulator transition (MIT). N-type semiconducting MoS₂ that is under a large negative gate bias, generates photocurrent by an optical excitation that is attributed to the increase of excess carriers in the conduction band. However, under a large positive gate bias that causes a phase shift from the semiconducting to a metallic MoS₂ the photocurrent by excess carriers in the conduction band by the laser disappears by enhanced electron–electron scattering. Thus, no photocurrent is detected in metallic MoS₂. Our results indicate that the photocurrent of MoS₂ can be switched by MIT transition that is controllable using the gate bias.

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