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Photo Sensor Devices Based on Atomically Thin TMDCs NESTOR PEREA, ANA L. ELIAS, Physics Department and Center for 2-Dimensional Materials, Penn State University, NIHAR PHRADAN, National High Magnetic Field Laboratory, ZHONG LIN, BARTOLOMEU CRUZ-VIANA, Physics Department and Center for 2-Dimensional Materials, Penn State University, LUIS BALICAS, National High Magnetic Field Laboratory, HUMBERTO TERRONES. MAURICIO TERRONES, Physics Department and Center for 2-Dimensional Materials, Penn State University, ALNOS MURI COLLABORATION — Few-layered films of different transition metal dichalcogenides (TMDCs) like MoS2, WS2, and WSe2 were successfully used as light sensors. The samples were structurally characterized by Raman spectroscopy, AFM, SEM, and HRTEM. The produced samples consisted of few layered sheets possessing up to 10 layers obtained by different synthetic or isolation methods including low-pressure CVD, atmospheric-pressure CVD and mechanical exfoliation. Current-voltage (I-V) and photo response measurements carried out by connecting the TMDC layered sample with Au/Ti contacts. The photocurrent measurements were carried out at different wavelengths from 400 to 800 nm. The results indicate that the electrical response strongly depends on the photon energy from the excitation lasers. In addition, it was found that the photocurrent varied non-linearly with the incident power, and the generated photocurrent in the WS_2 samples varied as a squared root of the incident power. The response time of the devices was measured and resulted in the order of few milliseconds. Because of its fast response, good responsivity and stability few-layered TMDCs are strong candidates for constructing novel optoelectronic devices.

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