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**Electronic and optoelectronic properties of Few Layer MoS<sub>2</sub> Flake**

JIE ZHANG, SUJOY GHOSH, MILINDA WASALA, SAIKAT TALAPATRA, Department of Physics, Southern Illinois University Carbondale IL-62901, USA — We will report on the electronic and optoelectronic properties of few-layers flakes of MoS<sub>2</sub> obtained by mechanical exfoliation of bulk MoS<sub>2</sub> crystal. Measurements performed in field effect transistor (FET) geometry show a room temperature mobility  $\mu_{FE} \sim 40\text{cm}^2\text{V}^{-1}\text{s}^{-1}$ . Temperature dependent ( $50\text{K} < T < 300\text{K}$ ) photoconductivity measurements investigated using continuous laser of  $\lambda = 658\text{nm}$  ( $E = 1.88\text{eV}$ ), over a broad range of illuminating laser intensity,  $P$  ( $0.1\mu\text{W} < P < 2\mu\text{W}$ ) indicate a fractional power dependence of steady state photocurrent on  $P$ . Room temperature responsivity obtained in these samples were found to be  $\sim 1\text{AW}^{-1}$ . Variation and/or dependence of these measured properties with respect to temperature will be presented and compared with similar measurements performed other layered 2D Transition Metal Dichalcogenides. This work is supported by the U.S. Army Research Office through a MURI grant # W911NF-11-1-0362.

Sujoy Ghosh  
Department of Physics, Southern Illinois University  
Carbondale IL-62901, USA

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