

Graphene - Transition Metal Dichalcogenide Heterostructures for Efficient Photodetection at Room Temperature

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Graphene and Transition metal dichalcogenide (TMDC) based devices in field effect transistor (FET) architecture have been well studied for optoelectronic device applications as they showed large photo responsivity. While high responsivity is demonstrated at low temperature, the details and nature of room temperature (RT) photo response are not very well known. Our observations from detailed temperature dependent photo relaxation experiments give insights into the crucial role of thermal energy on the dynamics of photo response in graphene-TMDC heterostructures. We further describe the speed of the devices, which appears to be in the order of 10 ms at RT. Their superior photo conducting gain ($G \approx 10^5$ at RT) gives a high gain bandwidth product ($\approx 10^6$ Hz) compared to several other photodetectors and enlist them as one of the most efficient photodetectors.

