Sensor Applications with Graphene, 2D TMDC, MXene and Their Composites

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Firstly, I will present a flexible and transparent graphene gas molecular sensor integrated with graphene heater and a gas molecule sensor of van der Waals tunnel field effect transistors with graphene/WS2/graphene (G/WS2/G) vdW heterostructure tunnel FETs.

Secondly, I will introduce a surface plasmon resonance enhanced near-infrared photo-detector in single-layer MoS_2 with vertically aligned nano-flakes by broadening the detection ranges from the visible region to the NIR region in the O_2-v-MoS_2 photodetector.

Finally, I will demonstrate flexible and wearable pressure-strain sensors for human motion detection. Two sensors are based on graphene composites such as rGO (Reduced Graphene Oxide)-SWCNT composite coated fabrics and MoS_2/Graphene foam/Ecoflex hybrid nanostructures. In addition, I will introduce a multifunctional EMI shielding skin with excellent EMI shielding effectiveness (SE) and pressure sensing performance as well.