

Highly stretchable and transparent photodetectors based on two-dimensional transition metal dichalcogenides films

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Among 2D semiconductor materials, transition metal dichalcogenides (TMDs) have shown potential in the field of photodetector and motion detection. TMDs have been considered to be promising photoelectronic material due to their specific properties such as transparency and band-gap.

Flexible displays and wearable devices based on 2D materials are limited to application of one-way bending. However, as a large-scale deposition technique of TMDs has been developed, the possibility of applying to stretchable device has been opened. Nevertheless stretchable photodetector based on TMDs has not been reported yet.

Herein, we fabricated stretchable photodetector with Molybdenum disulfide (MoS₂).

MoS₂ has outstanding photoelectronic properties. We prepared photodetector patterned with a kirigami to distribute external stress. and then, we partially coated the surface of MoS₂ thin film with specific organic dye to improve photoelectronic properties. Our transparent photodetector has excellent performance and stability under the 30 % strain conditions.

We expect that our photodetector may contribute to development of flexible displays and wearable devices.