Supplementary Information (SI) for Journal of Materials Chemistry C.

Graphene enhanced charge transfer ITO optoelectronic synapse for artificial vision

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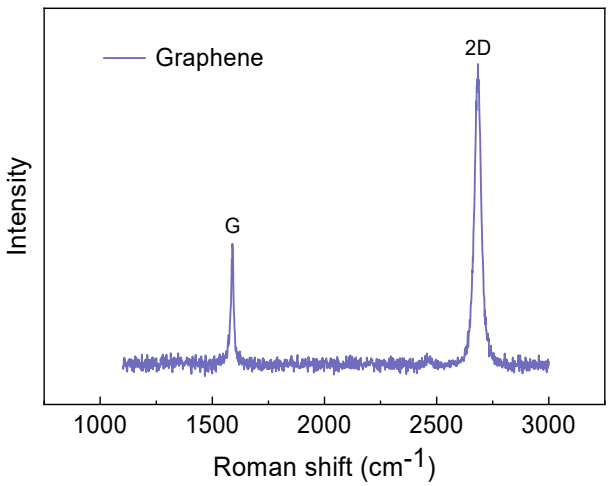

Figure S1. Graphene Raman Spectrum Image.

The degree of defects in graphene is related to the D peak at 1350cm^{-1}. As shown in Figure S1, the D peak of graphene is not obvious, indicating a lower degree of

internal defects in graphene. The number of layers of graphene is mainly determined by the ratio of the intensity of the G peak at 1589.53cm^{-1} and the 2D peak at 2684.28cm^{-1}. The ratio of I_G/I_{2D} is approximately 0.402, indicating that the number of graphene layers is a single layer. [1]

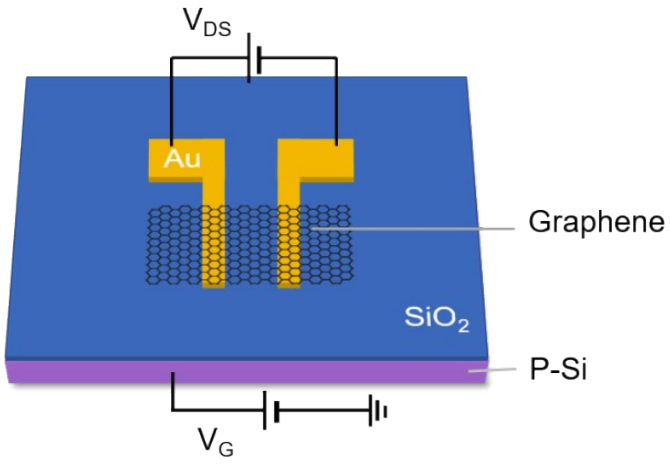

Figure S2 Schematic diagram of Au/Gr/Au optoelectronic devices.

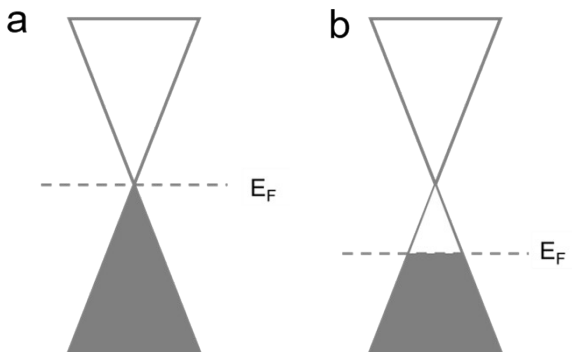

Figure S3 (a) Schematic diagram of intrinsic graphene energy bands. (b) Schematic diagram of P-type doped graphene energy bands.

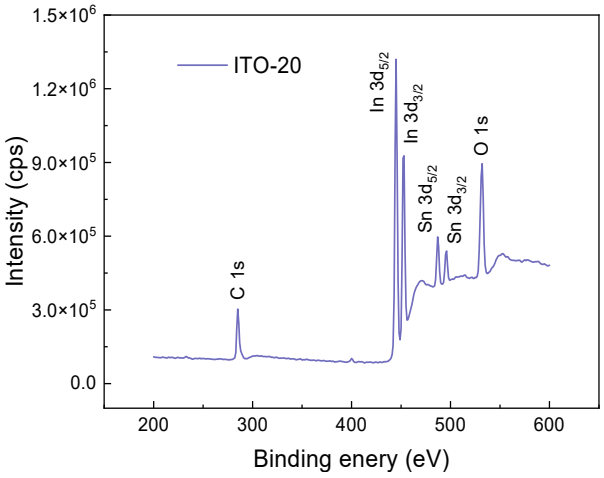

Figure S4 XPS full spectrum of ITO thin film with an oxygen flow rate of 20sccm.

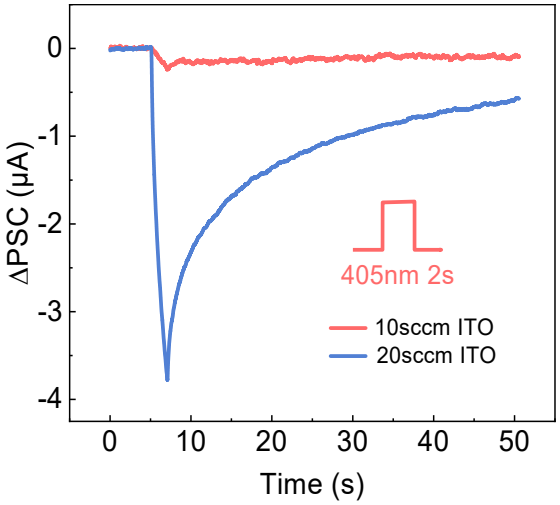

Figure S5. IPSC triggered by ITO graphene synapses with oxygen flow rates of 10 sccm and 20 sccm under ultraviolet light (405 nm, 2 s, 198 $mWcm^{-2}$).

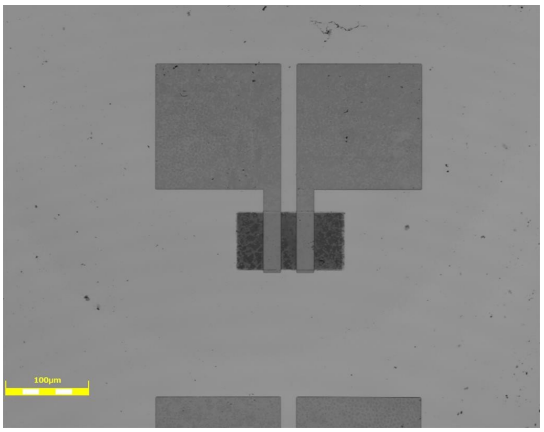

Figure S6 Confocal Microscopic Images of Au/ITO-Gr/Au Devices.

Reference

(1) Malard, L. M.; Pimenta, M. A.; Dresselhaus, G.; Dresselhaus, M. S. Raman spectroscopy in graphene. *Physics Reports* **2009**, *473* (5-6), 51-87. DOI: 10.1016/j.physrep.2009.02.003.