Flexible Organic Light Emitting Diodes (OLEDs) with multi-layer Graphene Anode

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Graphene anodes are promising candidates for replacing indium tin oxide anodes in next-generation flexible organic light-emitting diodes (OLEDs). However, OLEDs with graphene anodes suffer from low luminous efficiency due to their low work function and high sheet resistance. This paper presents a method for fabrication of flexible OLEDs with graphene anodes, exhibiting high work function, low sheet resistance and an extremely high luminance. We first optimized a single-layer graphene growth process on a flexible substrate. OLEDs are fabricated by stacking 8-layers of optimized graphene films and doped with nitric acid to reduce the sheet resistance. The fabricated anodes are characterized by using a conventional Hall Effect Measurement System (HEMS) where sheet resistance is measured as 30 Ω/□. ADS 108 GE is used as active layer which has a low turning on voltage and allow to have a high luminance and flexible OLED on PET substrate. We believe that these results may be the starting of point of next-generation flexible organic optoelectronics where graphene anodes are used.

References

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[2] N. Li, S. Oida, G. S. Tulevski, S. Han, J. B. Hannon, D. K. Sadana, and T. Chen, Nature Communications, 1-7.
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Figures

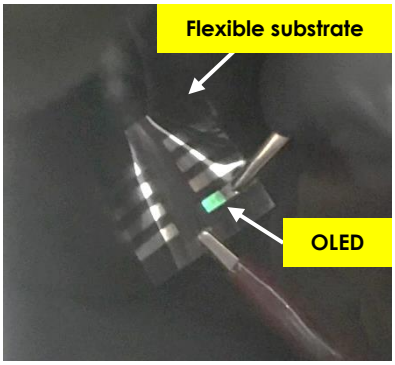
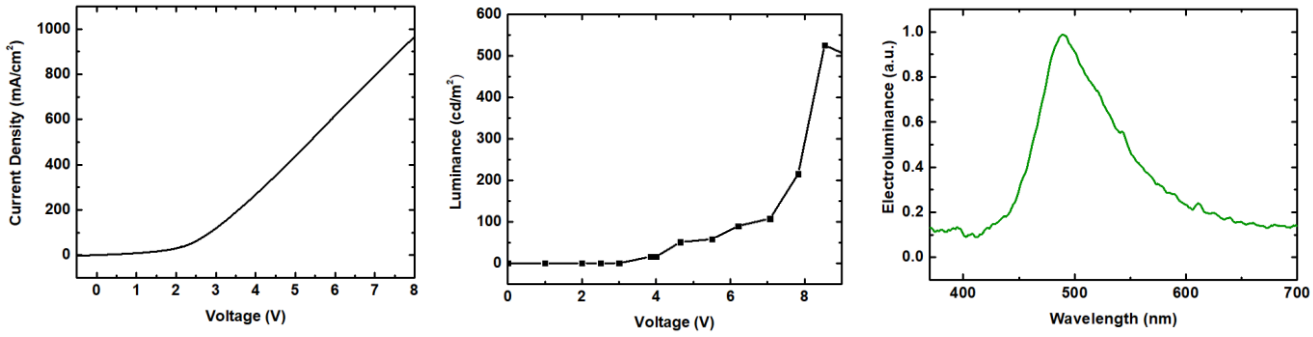


Figure 1: Picture of fabricated OLED using p-doped multi-layer graphene.



(a) (b) c)

Figure 2: Characterization results of OLEDs with graphene anode on a flexible substrate: (a) I-V curve, (b) luminance-voltage characteristics, and (c) electro-luminance spectra.