

# **The role of graphene formed on silver nanowire transparent conductive electrode in ultra-violet light emitting diodes**

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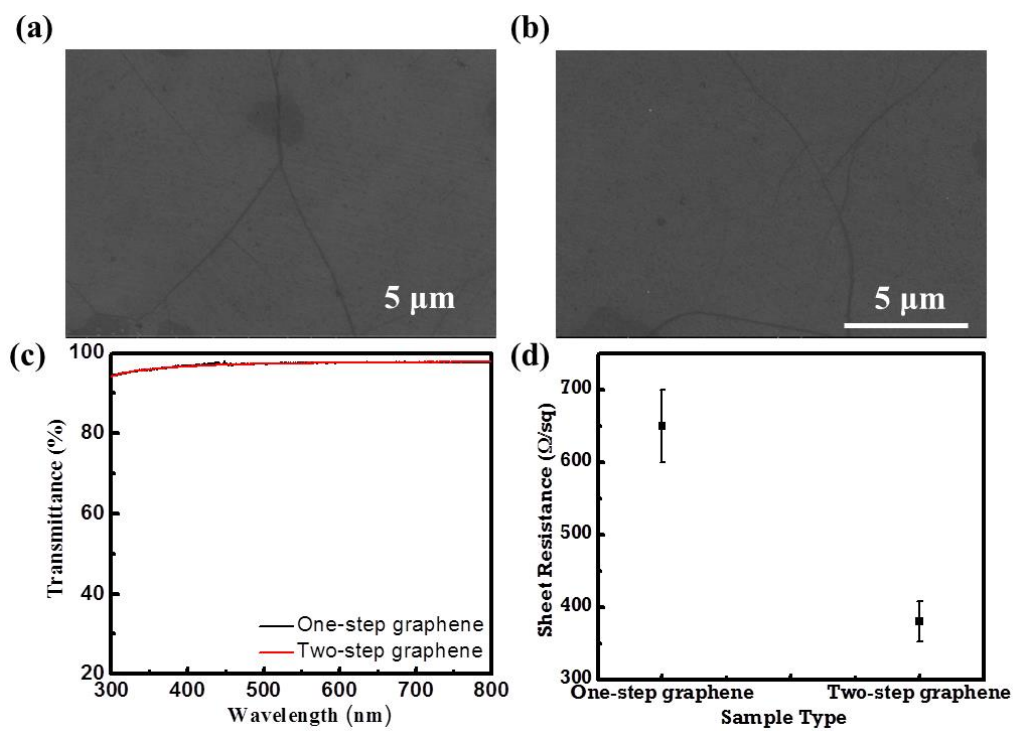
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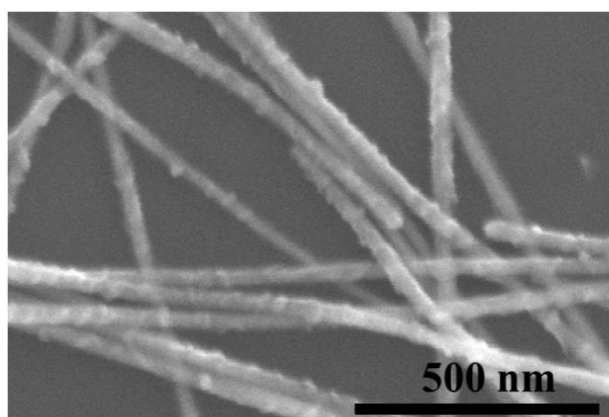
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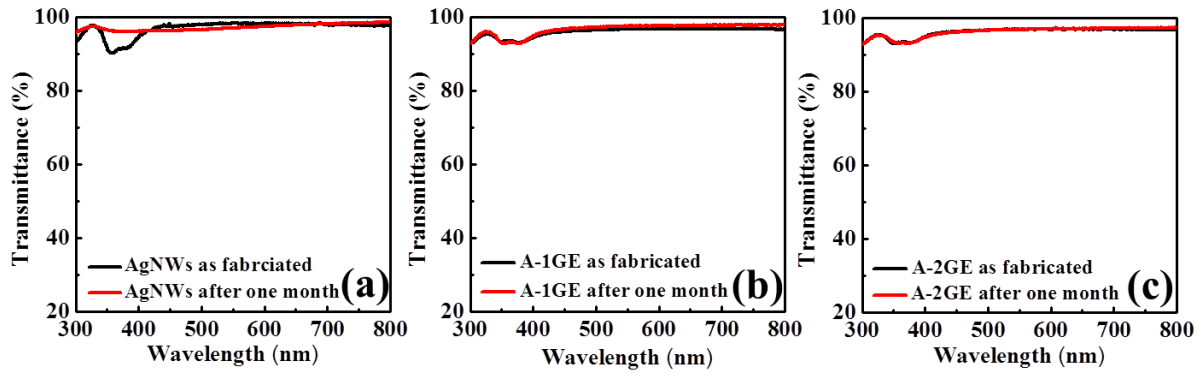
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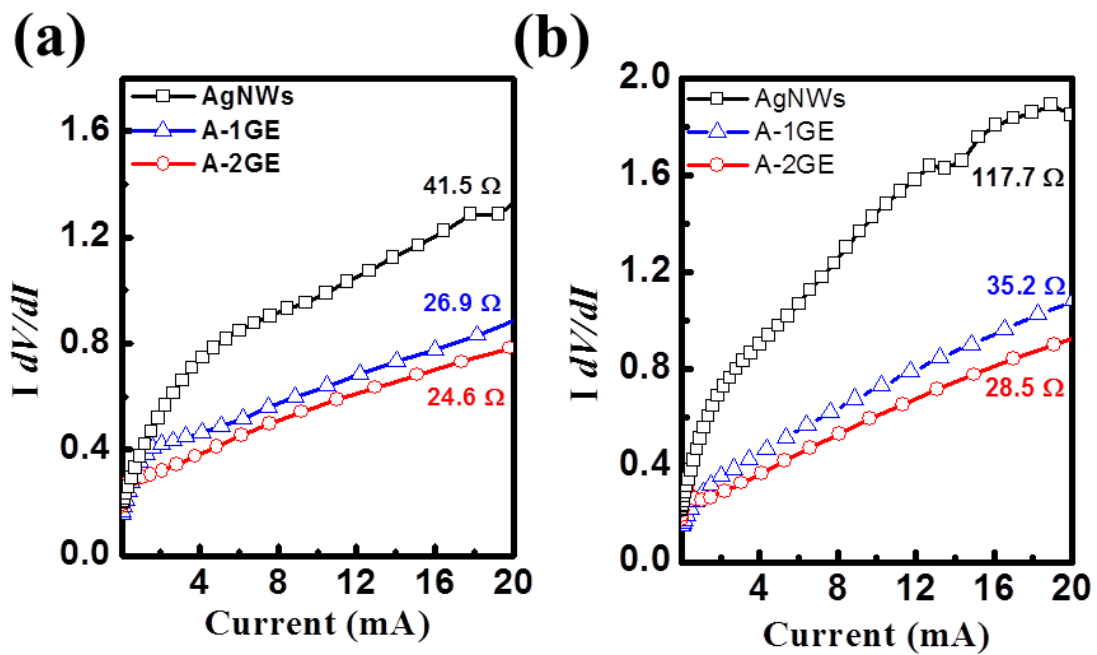
**Figure S1.** SEM images of fully-covered (a) one-step and (b) two-step graphene, respectively. (c) and (d) their opto-electrical properties.



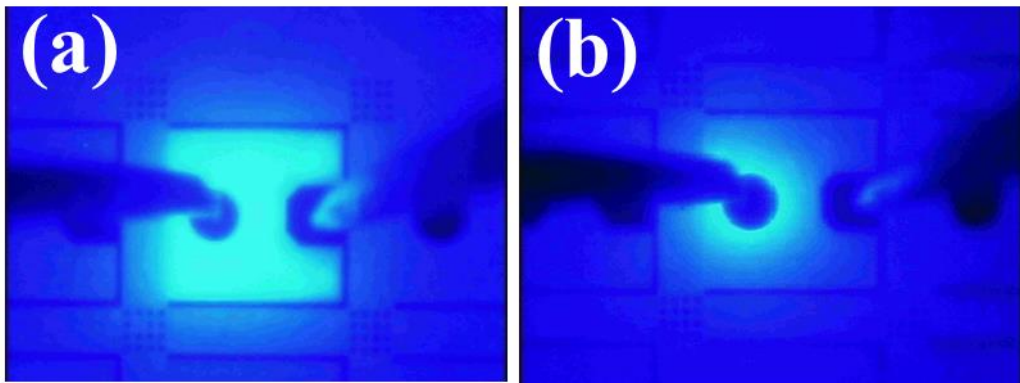
**Figure S2.** The SEM image of AgNWs formed on sapphire.



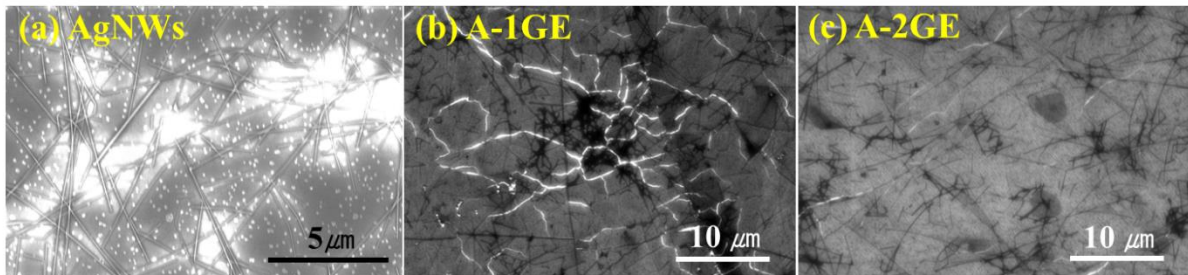
**Figure S3.** Transmittance characteristics of (a) AgNWs, (b) A-1GE, and (c) A-2GE as a function of wavelength on polished sapphire substrate at initial and after one month.



**Figure S4.**  $I(dV/dI)$  versus  $I$  plots for LED with various electrodes at (a) initial and (b) after one month



**Figure S5.** EL images of blue-LEDs using bare AgNWs during light emission at an injection current 5 mA at (a) first and (b) after one month.



**Figure S6.** SEM images of (a) AgNWs, (b) A-1GE, and (c) A-2GE after exposed 380 nm UV emission during 300 s, respectively.