Graphene Encapsulation for Plastic OLEDs

Byung Hee Hong[1,2]

[1]*Graphene Research Center for Convergence Technology & Department of Chemistry, Seoul National University, Seoul 08826, Korea.*
[2]*Graphene Square Inc., Inter-University Semiconductor Research Center, Seoul 08826, Korea.*

byunghee@snu.ac.kr

The use of graphene as a transparent electrode has already been demonstrated in a variety of flexible optoelectronic devices, including touch-screen sensors, organic light-emitting diodes and organic photovoltaic devices.[1] In addition, graphene's outstanding gas-barrier properties[2,3] are intensively investigated to develop an encapsulation layer for various flexible display and energy devices. Preventing reactive gas species such as oxygen or water is important to ensure the stability and durability of organic electronics. Although inorganic materials have been predominantly employed as the protective layers, their poor mechanical property has hindered the practical application to flexible electronics. The densely packed hexagonal lattice of carbon atoms in graphene does not allow the transmission of small gas molecules. In addition, its outstanding mechanical flexibility and optical transmittance are expected to be useful to overcome the current mechanical limit of the inorganic materials. In this talk, the practical measurement of the water vapor transmission rate (WVTR) of large-area graphene films synthesized by chemical vapor deposition (CVD) will be discussed first.[4,5] In addition, the graphene-passivated organic electronic devices that exhibit excellent environmental stability as well as a prolonged lifetime with extreme mechanical flexibility will be presented.

References

[1] Jong-Hyun Ahn, Byung Hee Hong, *Nature Nanotech.* 9 (2014), 10453.
[2] Jong Bo Park *et al*. *2D Mater*. 3 (2016), 045004.
[3] Dongha. Shin *et al. Nature Commun.* 6 (2015), 6068.
[4] Kyungjun Choi *et al. ACS Nano.* 9 (2015), 5818.
[5] Hong-Kyu Seo *et al. ACS Appl. Mater. Interfaces*, 8 (2016),4725.

Figures

Figure 1: Possible applications of graphene electrodes and encapsulation layers for plastic OLEDs.[1]