Bandgap control of doped graphene by laser direct writing on PET polymer substrate from PBI ink

Yihe Hunag[1], Zhu Liu[2], Lei Zeng[2], Chongguang Liu[2], Desen Zeng[2], Xusing Liu[2], Xiangli Zhong[2], Wei Guo[2], Lin Li[1]*

1. *Laser Processing Research Centre, School of Mechanical, Aerospace and Civil Engineering, The University of Manchester, Oxford Road, Manchester, M13 9PL, UK*
2. *School of Materials, The University of Manchester, Oxford Road, Manchester, M13 9PL, UK*

Corresponding author: lin.li@manchester.ac.uk

Standard graphene does not have bandgaps. In this presentation, a laser direct writing technique is reported to form S- and N-doped graphene patterns on thin polyethylene terephthalate (PET) substrates from a specially formulated polybenzimidazole (PBI) ink, without the need for a metallic coating. A UV laser beam of 355 nm wavelength was used. The sheet resistance of the laser-induced graphene was as low as 12 Ω sq^{-1} , matching that of indium–tin oxide (ITO). This technique allows the tailoring of bandgaps of the graphene and thus controlling electrical and chemical properties. Potential applications include printing of flexible electronics, sensors, and smart wearable.