

Laser photochemical reduction and doping of graphene oxide for organic electronics

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This paper will present our recent work on the application of laser radiation for the photochemical reduction [1], functionalization and doping of graphene oxide (GO) sheets. In particular, we report on the first reduction technique, compatible with flexible, temperature sensitive substrates, for the production of flexible GO electrodes. It is based on the use of femtosecond laser irradiation for the in-situ, non-thermal, reduction of spin coated GO films on flexible substrates over a large area. Furthermore, we present a simple photochemical method for the simultaneous reduction and doping of GO sheets through pulsed UV laser irradiation of GO in liquid or gas media. Using this technique Cl and N doping was rapidly carried out at room temperature in only few minutes. Doping is accompanied by simultaneous reduction of GO which decreases oxygen levels from ~30% in as-prepared GO down to ~3% in pulsed laser irradiated GO. Potential applications of pulsed laser synthesized and modified materials in organic electronics, particular to bulk heterojunction organic solar cells and electron emission cathodes are demonstrated and discussed.

References

[1] E. Kymakis , K. Savva , M. M. Stylianakis , C. Fotakis , E. Stratakis, Adv. Funct. Mater. 2013, DOI: 10.1002/adfm.201202713

