Laser-reduced graphene for energy storage devices

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Graphene has attracted increasing attention in recent years [1] due to its excellent mechanical, optical and electrical properties. Its high theoretical surface area (2630 m2/g) and high electrical conductivity make it an attractive material for many industrial applications [2].
A layer of graphene can be prepared by several techniques: mechanical exfoliation from graphite, sublimation on a silicon carbide surface, or chemical vapor deposition growth on Cu or Ni. All these techniques produce high quality graphene, but may be quite expensive for industrial applications. Alternatively, the reduction of graphene oxide (GO) is a low cost technique for obtaining graphene material.

We report the reduction of GO by using an infrared laser. This is a single-step and scalable procedure which allows to make circuits and complex designs on different substrates without the need for chemicals, masks, catalysts or expensive equipment [3, 4]. Furthermore, the reduction degree of the oxide and, consequently, its electrical properties can be controlled by varying the laser intensity and the number of times that GO is exposed to the procedure.

The material obtained by this reduction process proves to be mechanically robust, with a high electrical conductivity and a high specific surface area. Therefore, this laser-reduced graphene oxide is an outstanding material for high-performance electrochemical capacitors as we also report in this work [5, 6].

References

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Figures

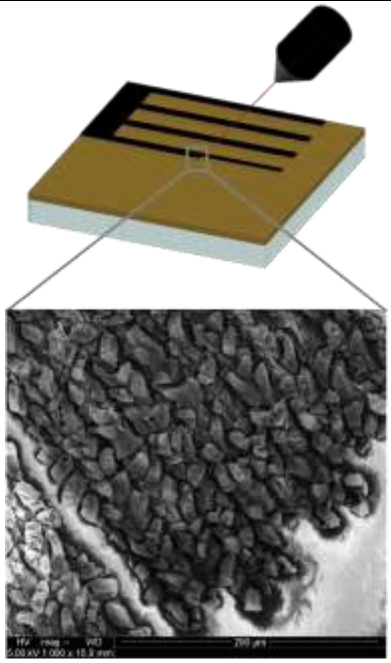

Figure 1: Schematic illustration of the reduction process and SEM picture of the laser-reduced GO.

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