Graphene devices fabricated by laser

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Abstract

Graphene, has attracted increasing attention in recent years [1] due to its excellent mechanical, optical and electrical properties. Its high theoretical surface area (2630 m^2 g^{-1}) and high electrical conductivity make it an attractive material for many industrial applications [2]. Also is a flexible transparent material that can be used for solar cells, light emitting diodes (LEDs, OLEDs), touchscreens and LCD displays [3].And in the near future, its flexibility will let to create foldable and wearable devices[4].

A layer of graphene can be prepared by several techniques: by mechanical exfoliation from graphite, by precipitation on a silicon carbide surface, or by chemical vapor deposition growth on Cu or Ni. All these techniques produced high quality graphene but are quite expensive for industrial applications. In the other hand, the reduction of graphene oxide (GO) is an alternative low cost technique for having graphene material.

In our case, the reduction of the GO was achieved by using a 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, transfer techniques, catalysts or expensive equipment. Furthermore, by varying the laser intensity and the number of times that GO is exposed, we can control the reduction degree of the oxide and, consequently, its electrical properties.

The material obtained by this reduction process proves to be mechanically robust with a high electrical conductivity and a high specific surface area, suggesting that this laser reduced graphene (LRG) may be used for manufacturing electronic devices or chemical sensors.

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References

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Figures

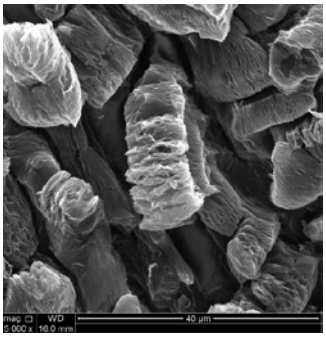

Figure 1. SEM picture of the reduced graphene oxide by laser