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Visible-light photo-reduction of reduced graphene oxide by lanthanoid ion

Jinok Kim, Gwangwe Yoo and Jin-Hong Park*

School of Electronics and Electrical Engineering, Sungkyunkwan University, Suwon 440-746, Korea

Grapehen, a single atomic layer of graphite, has been in the spotlight and researched in vaious fields, because its fine mechanical, electrical properties, flexibility and transparence. Synthesis methods for large-area graphene such as chemical vaper deposition (CVD) and mechanical, chemical exfoliation have been reported. In particular, chemical exfoliation method receive attention due to low cost process. Chemical exfoliation method require reduction of graphene oxide in the process of exfoliation such as chemical reduction by strong reductant, thermal reduction on high temperature, and optical reduction via ultraviolet light exposure. Among these reduction methods, optical reduction is free from damage by strong reductant and high temperature. However, optical reduction is economically infeasible because the high cost of short- wavelength ultraviolet light sorce.

In this paper, we make graphene-oxide and lanthanoid ion mixture aqueous solution which has highly optical absorbency in selective wevelength region. Sequentially, we synthesize reduced graphene oxide (RGO) using the solution and visible laser beam. Concretely, graphene oxide is made by modified hummer`s method and mix with 1 ml each ultraviolet ray absorbent Gd3+ ion, Green laser absorbent Tb3+ ion, Red laser absorbent Eu3+ ion. After that, we revivify graphene oxide by laser exposure of 300 ~ 800 nm layser 1mW/cm2 +. We demonstrate reproducibility and repeatability of RGO through FT-IR, UV-VIS, Low temperature PL, SEM, XPS and electrical measurement.

Keywords: Graphene, GO, RGO, lanthan

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The Effect of Thermal Annealing Process on Fermi-level Pinning Phenomenon in Metal-Pentacene Junctions

Hang-Il Cho and Jin-Hong Park*

School of Electronic and Electrical Engineering, Sungkyunkwan University, Suwon 440-746, Korea

Recently, organic thin-film transistors have been widely researched for organic light-emitting diode panels, memory devices, logic circuits for flexible display because of its virtue of mechanical flexibility, low fabrication cost, low process temperature, and large area production. In order to achieve high performance OTFTs, increase in accumulation carrier mobility is a critical factor. Post-fabrication thermal annealing process has been known as one of the methods to achieve this by improving the crystal quality of organic semiconductor materials

In this paper, we researched the properties of pentacene films with X-Ray Diffraction (XRD) and Atomic Force Microscope (AFM) analyses as different annealing temperature in N2 ambient. Electrical characterization of the pentacene based thin film transistor was also conducted by transfer length method (TLM) with different annealing temperature in Al- and Ti-pentacene junctions to confirm the Fermi level pinning phenomenon. For Al- and Ti-pentacene junctions, is was found that as the surface quality of the pentacene films changed as annealing temperature increased, the hole-barrier height (h-BH) that were controlled by Fermi level pinning were effectively reduced.

Keywords: pentacene, fermi level pinning, thermal annealing, OTFTs