

Negative photoconductivity in the fullerene C₆₀-few layer graphene system

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In situ electrical measurements of few layer graphene during thermal evaporation of fullerene C₆₀, and the behavior of this bilayer junction under illumination is reported. We obtained few layer graphene films by chemical vapor deposition technique, then fullerene C₆₀ was thermally evaporated on them. We found an increase in conductance of few layer graphene during the thermal evaporation of C₆₀. When the bilayer junction was under illumination, we observed a kind of negative photoconductivity [1] at low light intensities, and it is p-type doped, we propose that its behavior changes to n-type for high light intensities of illumination [2].

We also found that the Raman signal of C₆₀ is enhanced when it is on graphene, this effect is probably due to the so called Graphene Enhanced Raman Scattering [3].

We believe that the present findings may be useful for the design of devices using the C₆₀/graphene system for optoelectronic applications.

References

- [1] A. Rose, Concepts in photoconductivity and allied problems, Interscience, New York, (1963), 64.
[2] C. Bautista-Flores, R. Y. Sato-Berrú and D. Mendoza, Applied Physics Letters, **105** (2014) 191116.
[3] X. Ling, W. Fang, Y.-H. Lee, P. T. Araujo, X. Zhang, J. F. Rodriguez-Nieva, Y. Lin, J. Zhang, J. Kong, and M. S. Dresselhaus, Nano Letters, **14** (2014), 3033.

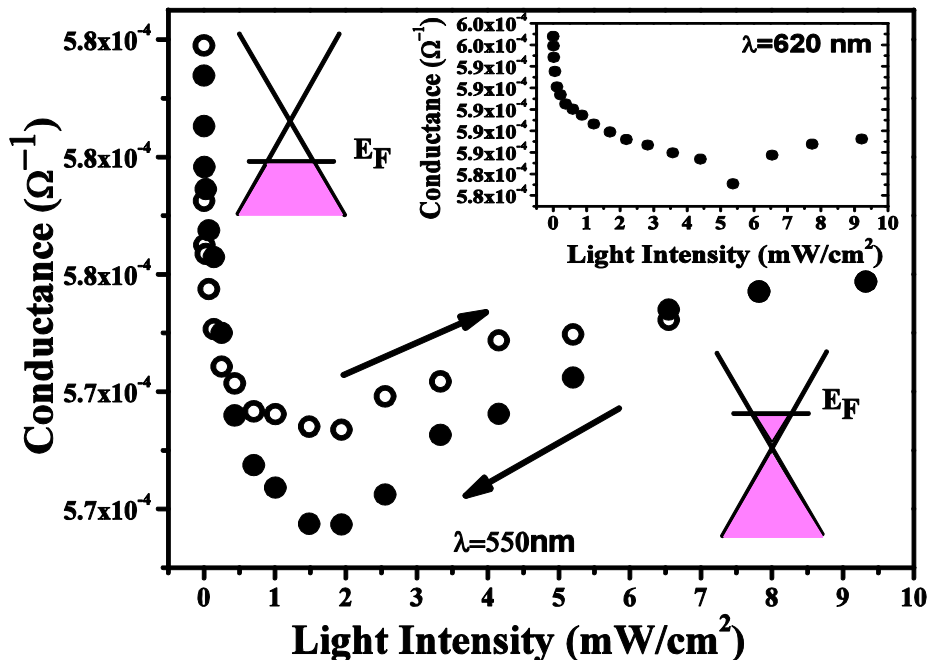


Figure 1: Conductance of C₆₀-Few layer graphene system as a function of light intensity, and schematic energy band diagram showing the position of Fermi level for low and high light intensities. In this case, a green filter centered at 550 nm was used. The arrows indicate the direction in which the light intensity was varied. For the results presented in the inset, a filter centered at 620 nm was used.