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Tesis: **"GRAPHENE DERIVATIVES FOR THE FABRICATION OF OPVs CELLS BASED ON PTB7:PC71BM"**

Resumen:

In the present work, organic solar cells based on PTB7:PC71BM as an active layer (AL) were manufactured under direct configuration, under conditions of regular atmosphere and by means of the spin coating technique. The base architecture that we used was Glass / ITO / PEDOT: PSS / PTB7: PC71BM / PFN / FM (1). Reduced graphene oxide (rGO) and solution-processable functionalized graphene (SPFG) were synthesized in the laboratory. They were used as a hole transport layer (HTL) and as a third component of the AL, respectively, thus modifying architecture 1 and giving rise to the following architectures: Glass / ITO / rGO / PTB7: PC71BM / PFN / FM (2), Glass / ITO / PEDOT: PSS / PTB7: PC71BM: SPFG / PFN / FM (3), and Glass / ITO / rGO / PTB7: PC71BM: SPFG / PFN / FM (4). For architecture 1, a thermal treatment (TT) of 80°C was applied to the AL, and an average conversion eficiency (PCEprom) of 6.46% was reached. In the case of architectures 2, 3 and 4, with the objective of activating the properties of the graphene0s derivatives, a TT of 150°C was applied to the AL. In the previous case, for comparison purposes, the AL of the reference samples manufactured under architecture 1 received the same TT, reaching, under these temperature conditions, a PCEprom=4.49 %. PCEsprom of 4.72 %, 5.44% and 5.48% were obtained for architectures 2, 3 and 4, respectively, which results in an increase of 24 and 19% of this parameter for the solar cells with ternary AL (3 and 4) with respect to the reference solar cells (1). The devices that used PEDOT:PSS (1) and rGO (2) as HTL presented a similar photovoltaic behavior. The results obtained show that rGO is a good substitute for PEDOT:PSS as HTL, and that the SPFG contributes to improve the eficiency of solar cells. Additionally, preliminary work was carried out to fabricate a graphene-base anode, obtaining resistance values of 6k Ω /sq, determined through the four-point method, and a transmittance of 93 %. Finally, a solar panel prototype was manufactured, which generated 4:22volts and 3:8mA under direct incidence of sunlight. This electrical energy was used to turn on two LED diodes, showing that this technology can generate the energy required by low consumption devices.