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New photodiodes based graphene-organic semiconductor hybrid materials

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Abstract

New photodiodes based graphene-organic semiconductor hybrid materials were fabricated for the first time using sol-gel spin coating technique. The current-voltage characteristics of the Au/GO:coumarin/p-Si/Al diodes were investigated under dark and various illumination intensities. The various junction parameters of the diodes were determined using I-V,C-V and transient characteristics. The transient photocurrent measurements indicate that Au/GO:coumarin/p-Si/Al diodes are very sensitive to illumination and the precise responsivity of the diodes is tunable by adjusting GO:coumarin fraction. The capacitance-voltage-frequency (C-V-f) measurements indicate that the capacitance of the diodes depends on voltage and frequency. The capacitance decreases with increasing frequency due to a continuous distribution of the interface states. The ability to tune the photosensitivity in the photoconductive mode through graphene oxide:coumarin weight ratio has been shown to lead to a near constant sensitivity to illumination for a weight ratio of 0.03GO. The obtained results suggest that Au/GO: coumarin/p-Si/Al diodes can be used as a photosensor in optic communications. (C) 2015 Elsevier B.V. All rights reserved.

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