Organic photodetector with coumarin-adjustable photocurrent

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Abstract

Drop casting technique was used to fabricate Al/p-Si/coumarin doped fullerite/Al diodes. The effects of coumarin doping on the photoresponse properties of the diodes were investigated. The forward bias current of the diodes increases exponentially with voltage confirming rectification behavior. The reverse current of the diodes increases with increasing illumination intensities. The photocurrent of the diodes is higher than the dark current. The obtained m value indicates that the photocurrent exhibited a linear photoconducting behavior. The coumarin doped fullerite diodes indicate a non-ideal behavior with obtained ideality factors. The obtained barrier height value of the Al/p-Si/coumarin doped fullerite/Al diode is comparable to that of the conventional Al/p-Si (phi(b) = 0.58 eV) Schottky diode. The measured values of the capacitance decrease with the increasing frequency. The decrease in capacitance was explained on the basis of interface states. It was concluded that the obtained barrier height and interface state density values of the diode are modified doping fullerite with coumarin. The obtained results suggest that the fabricated diodes could be used as an optical sensor in various optoelectronic applications. (C) 2016 Elsevier B.V. All rights reserved.

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