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Ambipolar small molecular semiconductor-based heterojunction diode

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Abstract

A heterojunction diode based on an ambipolar organic semiconductor 2,8-bis(5-(2-octyldodecyl)thien-2-yl)indeno[1,2-b]fluorene-6,12-dione (20D-TIFDKT) was fabricated on p-Si using a drop-casting technique. The current-voltage and capacitance-voltage characteristics of Al/20D-TIFDKT/p-Si/Al devices with aluminized contacts were investigated under dark and 100 mW/cm(2) illumination intensity. The result is a novel interface-state controlled diode device that is shown to be rectifying. In the forward, bias it has a current that depends on the illumination intensity at constant bias, showing potential application in low-power solar cell application. In the reverse bias, it has a response that depends on the illumination intensity regardless of the applied reverse bias. This suggests a potential use as a sensor in photoconductive applications. Between 0 and 0.7 V forward bias, the ideality factor, series resistance and barrier height average at 2.35, 67.6 k Omega and 0.842 eV, respectively, regardless of illumination. (C) 2016 Elsevier B.V. All rights reserved.

Keywords

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