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Fabrication and study the performance of solar cell made from new nanostructure phthalocyanine complex thin film

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Abstract

Nanocrystalline thin film of 2,3,9,10,16,17,23,24-octa(n-hexyl) phthalocyaninoruthenium(II), [(n-hexyl)(8)PcRu] deposited under high vacuum by thermal evaporation technique. The surface morphology of [(n-hexyl)(8)PcRu] thin film was measured using transmission electron microscopy (TEM) which showed nano-rod structures. The current-voltage (I-V) and capacitance-voltage (C-V) measurements of [(n-hexyl)(8)PcRu] onto p-Si substrate were studied. Dark current voltage (I-V) measurement was investigated at different temperatures ranging from 308 to 378 K indicates two conduction mechanisms: the first at lower forward voltages thermionic emission and second at higher forward voltages space charge limited currents (SCLC) with a single trap level. The ideality factor, n, series resistance R_s, shunt resistance, R_{sh}, and barrier height, Phi(b), were determined. The study of reverse voltage bias was interpreted in terms of generation-recombination. Abrupt nature was observed from dependence of capacitance-voltage for the device. Photovoltaic behavior was exhibited with power conversion efficiency eta of 2.1%. (C) 2014 Elsevier B.V. All rights reserved.

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