Fabrication and Characterization of Organic-Inorganic (Orange Dye-Vanadium Oxide) Composite Based Humidity Sensors

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The orange dye-vanadium oxide (OD-V₂O₅) composite films were deposited from their aqueous suspension at various gravity conditions: at normal (positive) gravity (+1g) and negative gravity (-1g) by drop casting on to the surface type substrates having silver electrodes which were deposited by vacuum thermal evaporation. The aqueous suspension was prepared by dissolving and mixing OD and V₂O₅ in a distilled water with 2:1 wt%, respectively. The area of each silver electrode was 5x5 mm² and the gap between two electrodes was 30 µm, while the thickness of composite films was 10 µm. The effect of humidity on electrical parameters (capacitance and impedance) of the films were studied and it was observed that with rising humidity the impedance of all the samples decreased up to 30333 times while the capacitance increased up to 2000 times. The samples deposited at +1g showed more sensitivity (-2.6 MΩ/%RH) towards humidity as compared to samples deposited at -1g (-1.89 MΩ/%RH). These results are explained by influence of positive and negative gravity, surface tension forces and composition of the solution on the film formation.

Keywords: Organic semiconductor; Orange dye-vanadium oxide composite; drop-casting; gravity method; humidity sensing.

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