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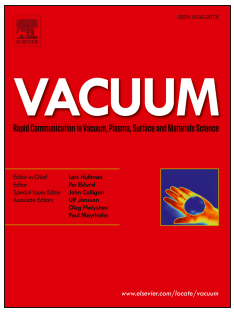

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Diazonium chemistry for making highly selective and sensitive CNT-Neutral Red hybrid-based chemiresistive acetone sensors

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Abstract:

In this present work, we reported the dye functionalization of CNTs via diazonium interface chemistry for designing new hybrid materials for sensing applications. Towards this end, Neural Red dye diazonium salt (DNR) was spontaneously reacted with MWCNTs in water at room temperature to synthesize CNT-NR nanohybrids and were characterized by an arsenal of complementary techniques (IRATR, Raman, TGA TEM, AFM and XPS) which proved effective and covalent grafting of a continuous amorphous aryl layer from the dye, the thickness of which ranges from 1-5 nm corresponding nearly 30% mass loading. The CNT-NR hybrid was dispersed in dimethyl formamide (DMF) and drop casted on glass substrates for sensing of different volatile organic compounds (VOCs) and was observed to be highly selective towards acetone with response of 7.14% for 1000 ppm of acetone with response/recovery time of 47 and 49 seconds at room temperature (RT).

Keywords: carbon nanotubes, diazonium salts, hybrid nanomaterials, chemi-resistive sensors.

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