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Structural, Electrical and Electronic Properties of carbon and carbon-based materials

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Abstract content
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In this work, we have studied the structural, electronic and electrical properties of diamond like carbon (DLC: a-C:H), silicon doped-DLC (a-C:H:Si) and nitrogen-doped amorphous carbon (a-CN_x) thin films grown by plasma enhanced chemical vapour deposition (PECVD) process. Un-doped DLC films were prepared at different applied bias voltage (V_b) starting from 100 V to 600 V, whereas the silicon is doped using tetramethylsilane (TMS) as a precursor at different SSCM and N is doped a-CN_x films were prepared at different at% N using nitrogen precursors. The thicknesses of all thin films are ~150 nm. Micro-structure and electronic properties were studied using Raman spectroscopy; whereas electrical properties were studied using voltage (V) vs current (I) measurements. It is found that the electrical conductivity is strongly responsible to the presence of sp²-hybridized carbon atoms in the thin films structure. We have obtained the (I_D/I_G) ratio of all thin films from Raman spectra and are correlated with the electrical conductivity.

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