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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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Wilfred Mbiombi, Zivayi Chiguvare, Daniel Wamwangi and Sekhar C. Ray* School of Physics, DST/NRF Centre of Excellence in Strong Materials and Materials Physics Research Institute (MPRI); University of the Witwatersrand, Pvt. Bag 3, WITS 2050, Johannesburg, South Africa

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-CNx) thin films grown by plasma enhanced chemical vapour deposition (PECVD) process. Un-doped DLC films were prepared at different applied bias voltage (Vb) starting from 100 V to 600 V, whereas the silicon is doped using tetramethysilane (TMS) as a precursor at different SSCM and N is doped a-CNx 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 (ID/IG) ratio of all thin films from Raman spectra and are correlated with the electrical conductivity.

• Corresponding Author: Sekhar.Ray@wits.ac.za (Sekhar C. Ray), Ph: +27-011-7176806

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Sekhar C. Ray, Sekhar.Ray@wits.ac.za

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Primary author: Mr MBIOMBI, Wilfred (Wits)

Co-authors: Dr WAMWANGI, Daniel (Wits University); Dr CHIGUVARE, Zivayi (Wits University)

Presenter: Mr MBIOMBI, Wilfred (Wits)

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