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Substrate effect on structural and magnetoresistance properties of amorphous carbon thin films

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The preparation and characterization of amorphous carbon (a-Carbon) thin films continue to be an active topic in contemporary surface materials science. Here, we explore the substrate effect of such thin films fabricated on glass and SiO2 substrates by pulsed laser deposition (PLD) technique through controlling experimental parameters including deposition time/temperature and laser energy/frequency. The structural and magnetoresistance (MR) properties of the as-prepared thin films were studied by means of High-Resolution Transmission Electron Microscopy (HR-TEM), Raman, X-ray Diffraction (XRD) and X-ray Photo Spectrometry (XPS). The D-band and G-band intensity (ID/IG) ratio was 4.0 and 4.7, whereas the percentage of the C(sp2) atomic ratio was 70 % and 74 %, for the sample thin films prepared on glass and SiO_2 substrates, respectively. MR properties were investigated under a magnetic field ranging from -9T to 9T in the temperature range of 2 K to 40 K. A positive MR value of 15% was observed at a low temperature of 2K for the thin films grown on SiO_2 substrate at a growth temperature of 400 with the laser frequency of 300 mJ/pulse. The structural vicissitudes can tune the magnetoresistance properties of such a-Carbon systems. The results designate that such properties are more auspicious for the magnetic sensors and carbon-based spintronics.

Speaker Biography

Awais Siddique Saleemi has completed his PhD at the age of 30 years from Tsinghua University, Beijing, China. He is working as a researcher at Institute for Advanced Studies, Shenzhen University, China. He has over 20 publications that have been cited over 70 times and is working on "Structural and magneto transport properties of amorphous carbon thin films synthesized by Chemical Vapor Deposition and Pulsed Laser Deposition.

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