Seminar, Department of Physical Sciences, Bose Institute, Kolkata

Atomically thin 2D-Field Effect Transistors and Printed Chemi-resistors for Rapid biopsy of Cancer, Chiral Spin Device, and Aquatic Hazards Assessment

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Abstract: This talk unveils a novel approach to 2D material-based detectors equipped with spatiotemporal control, paving the way for groundbreaking advancements in machine-intelligence-controlled-healthcare, environmental monitoring, quantum device and transistor technology. Inspired by the intricate architecture of butterfly wings, we've engineered a hierarchical stacked geometrical configuration (HSGC) utilizing functionalized graphene layers and helical cellulose-based sieves. This innovative design enables time-resolved separation and detection of individual molecules within a mixture, generating detailed mass spectrograms. This unlocks a plethora of possibilities, including real-time volatile organic compounds (VOC) spectrograms during machine learning enabled liquid biopsy, predicting growing cancer organoid's mutation status driven by most advanced generative AI, eliminating the need for complex procedures. Furthermore, spin-sensitive detectors made of chiral and DNA like hybrids hold promise for chiral/helical spintronics and quantum computing applications. Beyond this, we'll delve into the exciting potential of various 2D materials, including graphene, black phosphorous, employed in ultrafast field-effect transistors (FETs) for detecting heavy metals and bacteria aquatic samples. This talk explores a promising journey into the future of 2D material-based detection, showing its revolutionary potential to transform medical, quantum technology, environmental monitoring, and nanotechnological advancements for the betterment of our world.

Date/time: April 09, 2024 (Tuesday) at 12:00 noon; Venue: Physics Seminar Room (204, second floor, UAC, BI)