

Seminar

Atomic and Molecular Scattering as a Soft and Universal Probe for Surfaces

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Imaging surfaces using low-energy neutral atom scattering based microscopy is relatively a recent development. In this talk I will describe the design, development and characterisation of neutral atom microscope recently built in our lab. Our experiments show that this technique is sensitive enough to produce contrast from films as thin as a single monolayer. We have demonstrated this using collimated beams of He and Kr atoms as an incident probe on MoS₂ and WS₂ films grown on SiO₂/Si substrates. Further insights into contrast generation have been obtained by varying the incidence energy of probe atoms. In these studies, different qualitative behaviour is seen for lighter He atoms compared to heavier Kr atoms. The contrast shows a nearly monotonic decrease with lowering incidence energy for He, whereas for Kr a threshold behaviour is seen, suggesting the possibility of trapping-desorption at lower energies. In further experiments with the aim of increasing signal-to-noise ratio in our measurements, we have explored the use of seeded and atomic cluster beams. Interestingly, using atomic cluster beams of Ar and Kr we observed a contrast inversion on MoS₂ films grown on SiO₂/Si substrate. Current efforts to understand these results using angle resolved measurements will be discussed. Finally, the design and development of a compact cascaded collimator based atom beam source for real-time monitoring of surface coverage in reaction dynamics experiments on single crystal surfaces will also be presented.

Friday, Jul 22nd 2022

04:00 PM (Tea/Coffee at 3:45 PM)

Auditorium, TIFR-H