Title:	Imaging, Spectroscopy and Device fabrication using Scanning Probes
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Abstract:	In this thesis work, I have used scanning probe microscopy (SPM) as my pri- mary tool to investigate the physical and electrical properties of solids down to nano-metre range at room temperature and cryogenic temperature. Using atomic force microscope we have have studied the surface properties of Na 2 IrO 3 crystal and shown that the surface of crystallites evolves rapidly as elemental sodium ef- fuses out of the interleave planes to the surface and undergo sublimation. Using conductive AFM we recorded a series of topographs and surface current maps si- multaneously and found that the modification of the surface leads to change in the electronic properties in a dynamic fashion until the whole system reaches a dy- namic equilibrium. These observations are important in the context of the exotic electronic and magnetic properties that the surface of Na 2 IrO 3 displays. We have used scanning tunnelling microscopy and scanning tunnelling spectroscopy to show that superconducting phase in PdTe 2 , a type II Dirac semi-metal, is con- ventional in nature. Using Dynes equation we analysed the spectroscopy data and quantitatively estimated the superconducting gap Δ. We have also fabricated the metal-superconductor soft point contact device using nano hole indention technique and studied the transport properties by varying the magnetic field and temperature. I have also optimised the graphene exfoliation from HOPG for fabricating vanderwaal heterostructure.
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