Faculty Mapping with Bank of Thrust Areas of the Research

Identified Thrust Area	Sub Area	Faculty Name
Magnetism & Magneto transport (Manganite, Magnetic Oxides, Interfaces)	1. Spin-dependent transport and tunnelling magnetoresistance 2. Colossal magnetoresistance (CMR) in manganite systems 3. Exchange bias and interfacial spin coupling phenomena 4. Magnetic phase transitions and critical behavior analysis 5. Magneto caloric effect and magnetic refrigeration materials 6. Spintronic materials and device applications 7. Low-dimensional magnetic systems (thin films, nanowires, hetero-structures)	Dr. Khushal Sagapariya Dr. Vishal Vadgama
Thin Films, Ion Irradiation & Interface Engineering	1. Deposition techniques (PLD, RF/DC sputtering, ALD) 2. Structural, electrical, and optical tuning via ion irradiation 3. Multilayer and hetero-structure design for functional properties 4. Depth profiling and interface characterization (XRR, SIMS, XPS) 5. Stability and reliability analysis under irradiation conditions	
Ferrites, Spinel Oxides & Nanocomposites	1. Cation distribution and site occupancy in spinel ferrites 2. Magnetic and dielectric coupling in ferrite nanostructures 3. Soft and hard ferrite synthesis and applications 4. Substitutional doping and its impact on magnetic anisotropy 5. Magneto-optical and magneto electric studies in spinel systems	
Multi-ferroics, Ferroelectrics & BiFeO3 Oxides	1. Coupled magnetic and ferroelectric order (magneto electric coupling) 2. Phase transitions and domain structure studies 3. Doping and strain effects in $BiFeO_3$ thin films and ceramics 4. Polarization switching dynamics and leakage current mechanisms 5. Composite multiferroic hetero-structures for spintronic applications Ferroelectric photovoltaics and photo-ferroelectric effects	

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Semiconductor Oxides, Dielectrics & Nanostructures	1. Bandgap engineering and defect states in oxide semiconductors (ZnO, TiO_2, SnO_2, CdO, etc.) 2. Electrical transport and photoconductivity studies 3. Doping effects and charge carrier modulation 4. Dielectric relaxation, AC conductivity, and impedance spectroscopy 5. Growth and characterization of nanorods, nanowires, and quantum dots 6. Photoluminescence and optical absorption analysis 7. Oxide-based transparent conducting materials	Dr. Khushal Sagapariya Dr. Vishal Vadgama
Sensors, Devices & Interface Applications	1. Gas, humidity, and biosensor fabrication using oxide materials 2. Photodetectors, memristors, and resistive switching devices 3. Interface-controlled charge transport and contact engineering 4. Flexible and transparent electronic devices 5. Integration of oxide hetero-structures in multifunctional devices 6. Performance optimization under environmental conditions	

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