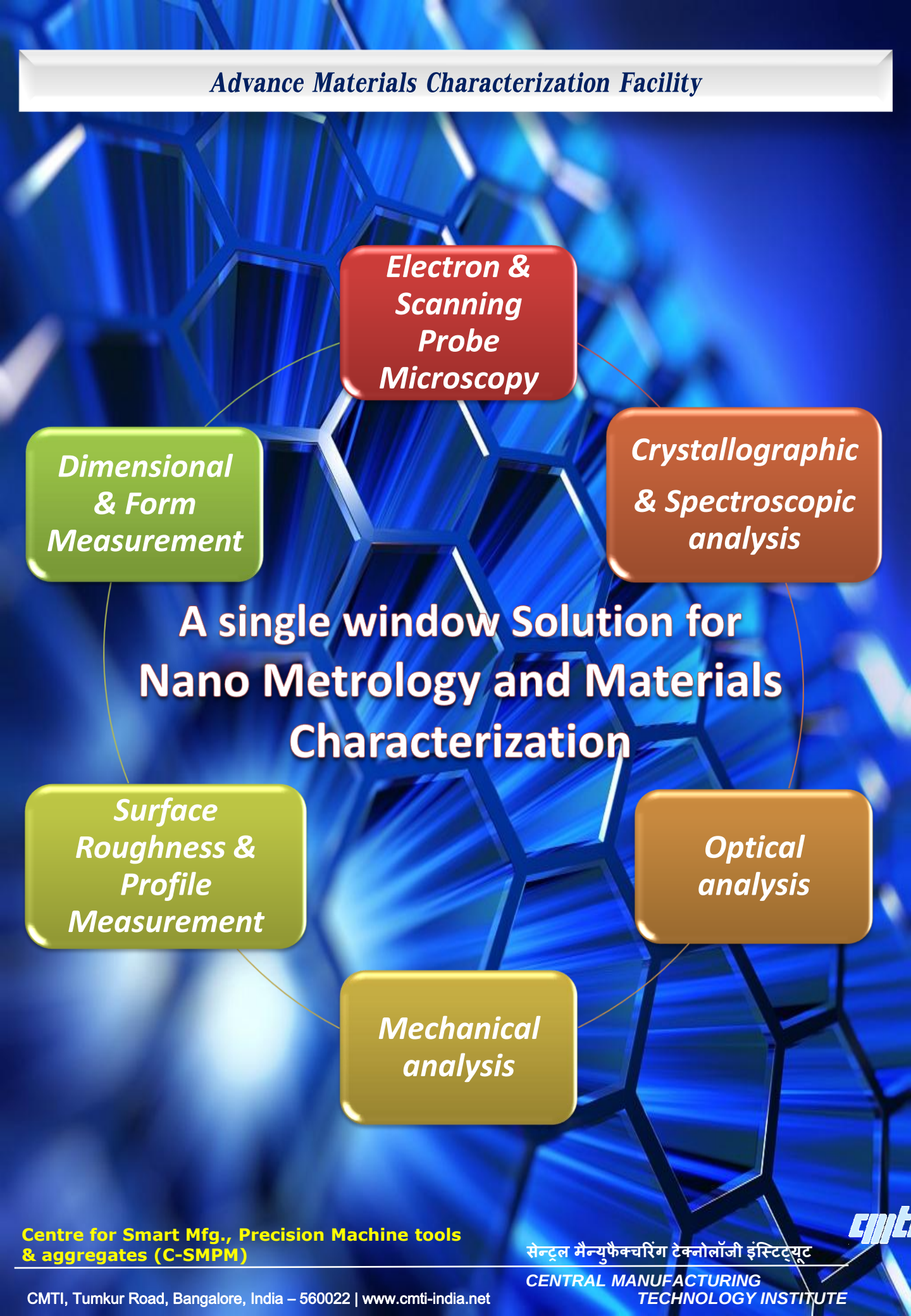
Advance Materials Characterization Facility



Centre for Smart Mfg., Precision Machine tools & aggregates (C-SMPM)

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CENTRAL MANUFACTURING TECHNOLOGY INSTITUTE

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AFM

Make: Veeco Model: Dimension V SPM

Specifications:

Resolution : 2 X 2 X 0.05 nm

Open-Loop head: X-Y scan range: 100 µm; Z scan range: 5.5 µm

Closed Loop Scanner: X-Y scan range: ~ 90µm ; Z scan range: ~15 µm

Sample Size:150 X 12 mm,150 X 9 mm

Microscope optics:150 µm to 675 µm viewing area

Applications :

Nanoscale 3D surface topography and texture analysis, Analysis of micron and nanoscale phase distribution and imaging, Mechanical and physical property measurements, Defect imaging in MEMS and IC failure analysis.

Optical Profiler

Make: Veeco Model: NT9100

Specifications:

Max Sample Size:150 X 150 X 80 mm

Field of view (X, Y): 0.3mm @ 50x & 0.17mm @ 100x

XY Optical Resolution: 0.55 µm @ 50x 0.36µm @ 100x

Z Resolution: 0.1 nm, Step Height Accuracy1%

Applications:

Topography, Surface Finish, Critical Dimensions, Radius of Curvature, MEMS, Semiconductors & Ics, Dynamic MEMS Technology.

Raman spectroscopy

Make: SEKI Technotron Corp Model: STR-300.

Specifications:

Laser Source: 514 nm (Ar^+ laser), 785 nm (Diode laser)

Monochromator: Triple grating with 600, 1200 and 2400 blz

Spectral Resolution: 0.75 cm^{-1} with 2400 blz

Confocal microscope depth resolution: 2 µm

Applications:

Composition of material, crystal symmetry & orientation, quality of crystal, stress/strain, amount of material.

Spectroscopic Ellipsometry

Make: J.A. Woollam Model: M2000X

Specifications:

Measuring Volume: 150 X 150 X 40 mm

Spectral Range: 250 - 1000 nm

Spectral Resolution : 1.6 nm

Applications:

Layer thickness, Optical constants, Composition / Crystallinity / Doping, Surface and Interfacial Roughness, Grading / Uniformity

Anisotropy, Any physical effect which induces changes in materials optical properties.

Nanoindenter

Make: Agilent technologies Model: G200

Load resolution: 1nN
Displacement Resolution: 0.0002 nm
Maximum Load: 500 mN
Maximum depth: 500 µm
Insitu imaging: 100 x 100 µm
LFM: > 250 mN

Applications:

Hardness and Modulus measurement, Fracture Analysis, Paints and coatings, Metals and Ceramics, Bio-materials, Metal-Matrix Composites, Polymers, Thin Films.

Particle size Analyzer

Make: Microtrac Model: Blue Wave

Specifications:

Lasers: Blue 405 nm and Red 780 nm
Measuring range: 0.02 to 2800 µm
Data handling: Volume, Number and Area distributions
Analysis: Dry powder and liquid suspension.

Applications:

Particle size identification and its distribution in Cosmetics, Pharmaceutical, Food, Metal industry, Paints, Pigments and Dyes, Cements and Chemical Industry.

FTIR

Make: Agilent technologies Model: Cary 660

Specifications:

Spectral measurement range: 6500-400 cm^{-1}(MIR), 500-20 cm^{-1} (FIR)
Spectral resolution: <0.06 cm^{-1}
Wavenumber resolution: 0.005 cm^{-1} @ 2200 cm^{-1}
Signal to noise ratio: 16000:1 peak to peak for 5 sec @ 4cm^{-1}
Measurement mode: Transmission, Absorption and ATR (Diamond and Ge crystal)

Applications:

Analyze composition of material, Analyze functional group, Analyze bonding signature in the material.

Surface Area Analyzer

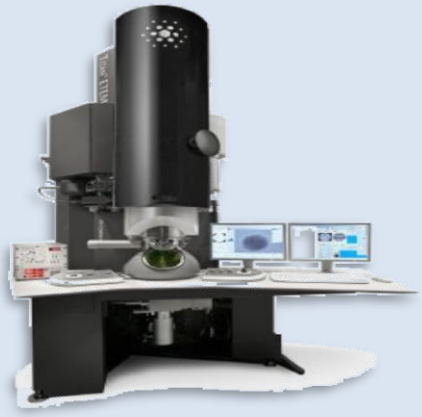
Make: Quantachrome Model: Autosorb-iQ-MP-XR & ChemBET PULSAR

Specifications:

Surface area range: From 0.01m^2/g
Pore size range: 3.5 to >4000 Å
BET/Mesopore Capable: (P/Po >1 x 10^{-3})
Micropore capable:(P/Po<10^{-4})
Features: Built-in Degasser Stations & Degas Cold Trap

Applications:

Micropore & Mesopore measurements, Specific surface area of phases, Types of active sites, Number of active sites, Reactivity of active sites and Stability of active sites.



TEM

Make: FEI Model: Titan G2 60 300 TEM

Specifications:

Resolution: TEM: 0.2 nm @ 300 kV, STEM : 0.136 nm @ 300 kV
EDX Resolution: 136 eV
Accelerating Voltages: 60 to 300 KeV
Stage: 5 axis , Range: X, Y : ± 1 mm, Z : ± 0.375 mm, α : ± 40° , β : ± 30°
Imaging modes: TEM, STEM-HAADF, BF, DF, EDS, Selected area diffraction, 3D Tomography

Applications:

Atomic Scale Imaging, Crystallographic studies, Plastic Deformations, Study of multi-layers and structures, Phase transformations, Defect inspection in semiconductor fabrication process, Elemental analysis.

FESEM + FIB

Make: Carl Ziess Model: Neon-40, FESEM/FIB

SEM Specification:

Type: Field Emission
Accelerating Voltage: 1-30 kV
Resolution: 1.2 nm @ 30 kV
Magnification: 12 x to 900 kx
Stage: 5 Axes Eucentric

FIB Specification:

Source: Ga Liquid Ion Emitter
Probe current: 1 pA to 50 nA
Resolution: 7 nm
Magnification: 600 x to 500 Kx
GIS: 5 Gases GIS

Applications:

SEM: Nano Scale Imaging, Surface Topography, Surface Morphology, EBSD, Z contrast Imaging, EDX, Elemental Mapping.
FIB: Nano scale machining . GIS assisted milling and deposition, TEM Lamella preparation.

XRD

Make: Bruker Model: D8 Advance

Specifications:

Configuration: Vertical Theta/2 Theta
Max. usable angular range: 110° < 2 Theta ≤ 168°
Smallest addressable increment: 0.0001°
Anodes: Cu, Cr & Co
Detectors: Scintillation & Lynxeye
Application softwares: EVA, LEPTOS & TOPAS

Applications:

Identification of crystalline materials, Sample purity measurement, Determination of Unit cell dimensions, Residual stress measurement and Determination of Degree of Crystallinity.

Other Facilities: Confocal Microscope, Rheometer & Micro hardness Tester

Electron Microscopy Sample Preparation Lab

For Details Contact

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