UNIVERSITY OF LIMERICK
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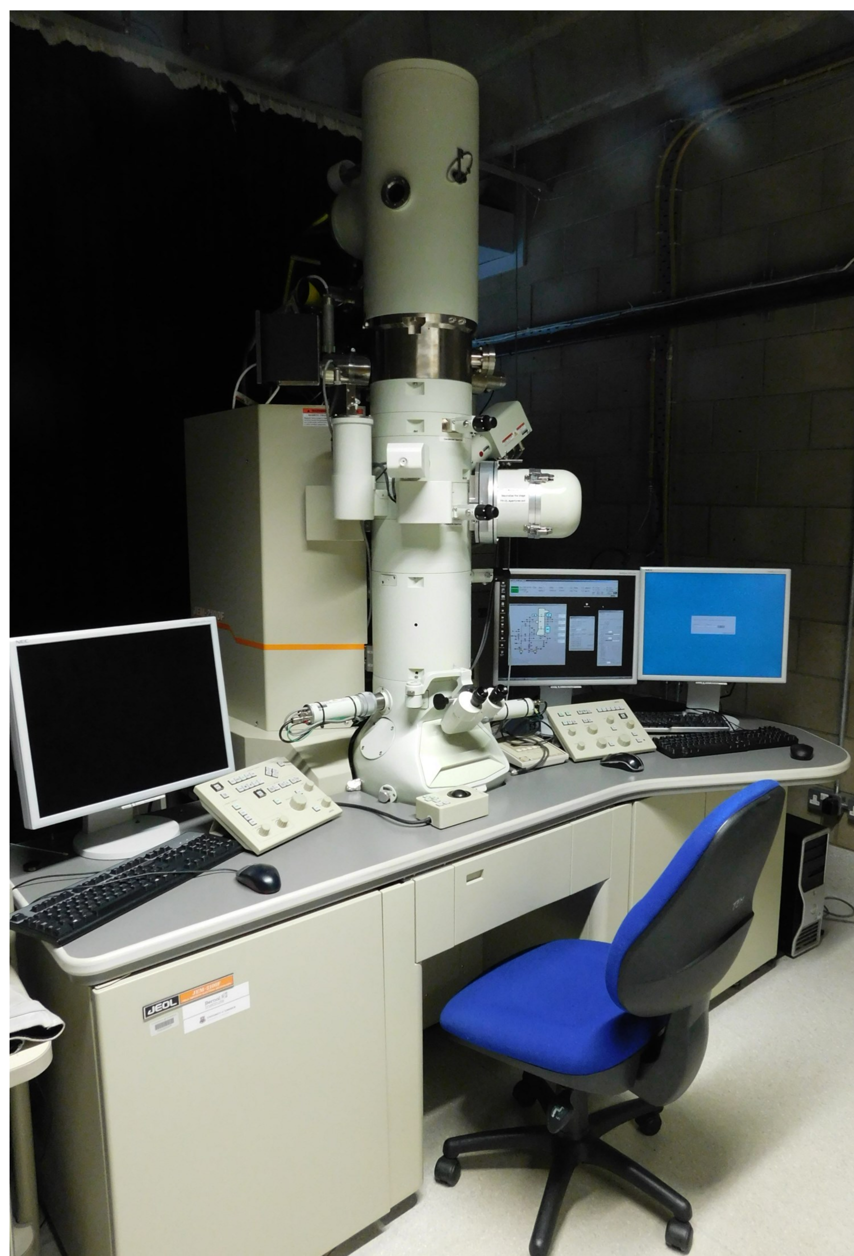
Bernal Institute

TRANSMISSION ELECTRON MICROSCOPY

JEOL 2100 FE

Transmission Electron Microscopy

This analytical method allows one to have a direct look on nanostructures and probe its morphology, sizes, crystallographical structure and chemical composition with high spatial resolution



JEOL 2100FE

Available holders

For JEOL 2100FE TEM, the following holders are available:

- single tilt
- double tilt
- bulk/multiple sample
- single tilt tomography
- dual orientation tomography

Available techniques

Currently, we are providing users with the following methods:

- High-Resolution TEM
- Bright Field and Dark Field TEM
- Selected Area Electron Diffraction (SAED)

Scanning Transmission Electron Microscopy (STEM) mode with different detectors available:

- High Angle Annular Dark Field (HAADF-STEM)
- Bright Field (BF-STEM)
- Secondary Electrons (SE-STEM)
- Local chemical composition analysis (STEM-EDX)

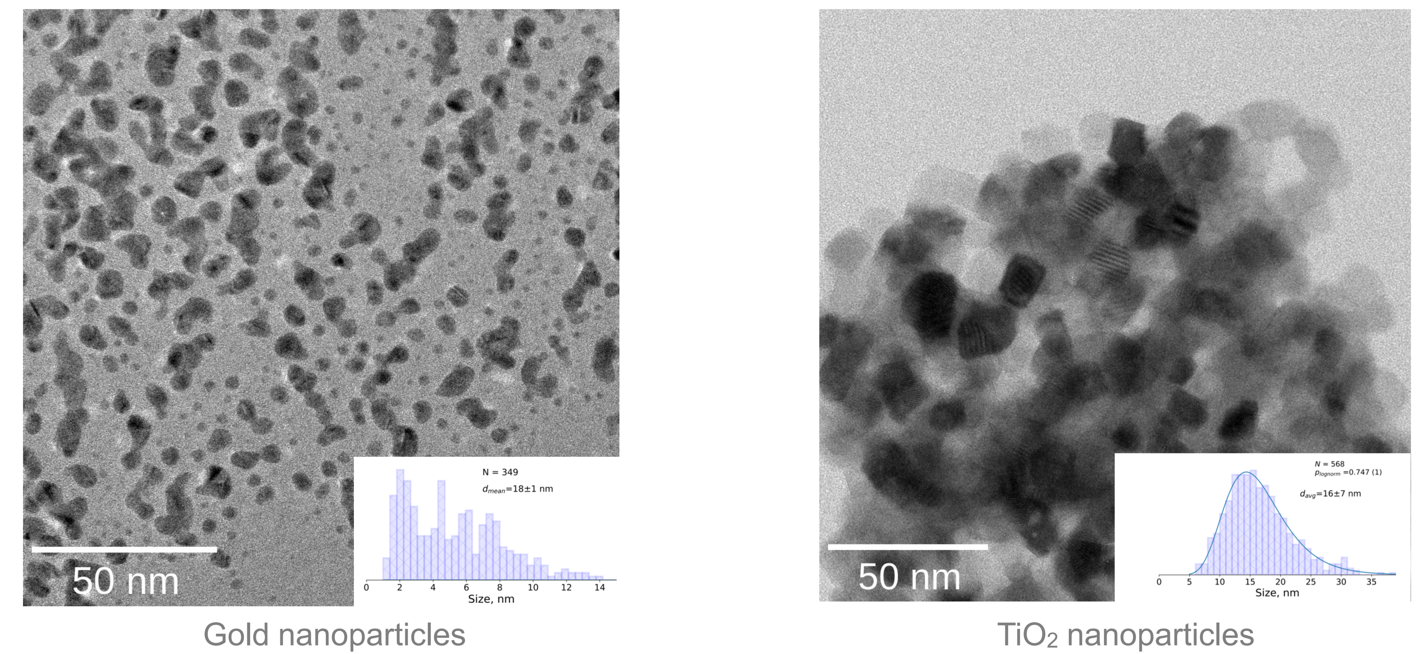
Requirements

Typical samples, suitable for this methods are nanopowders, suspensions of nanoparticles, or thin lamellae of metals or semiconductors.
Samples are expected to be thin (<300 nm) and transparent for electrons
Samples have to be stable to vacuum and electron radiation

NB! The relative uncertainty of sizes measured by TEM is **~5%**

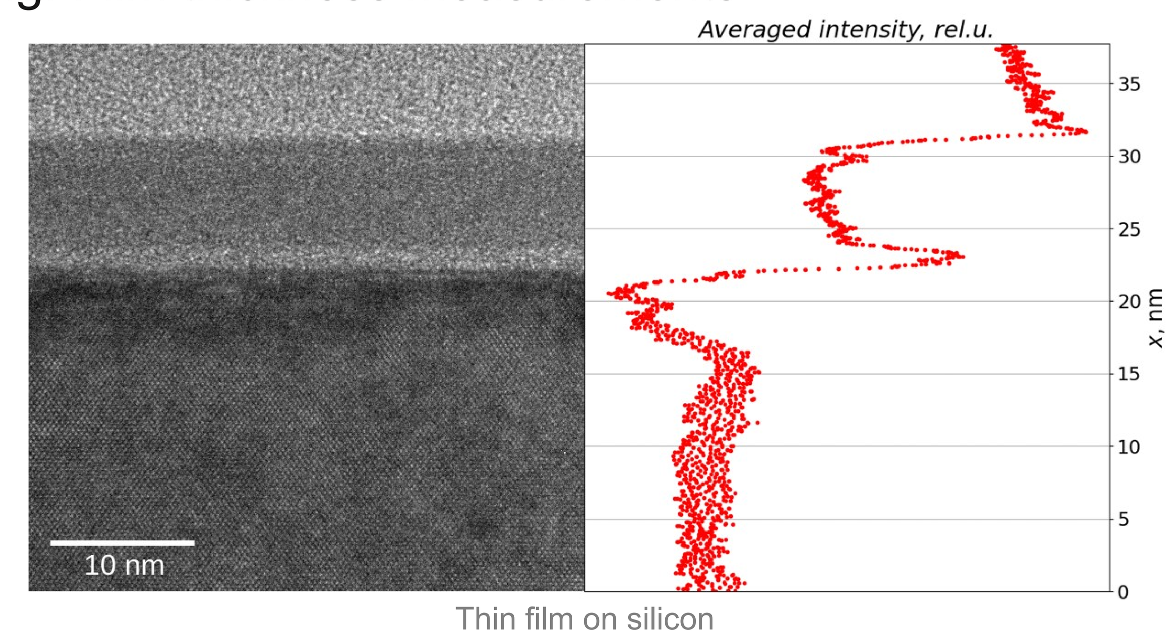
Some examples of application

TEM imaging: Particles size distributions



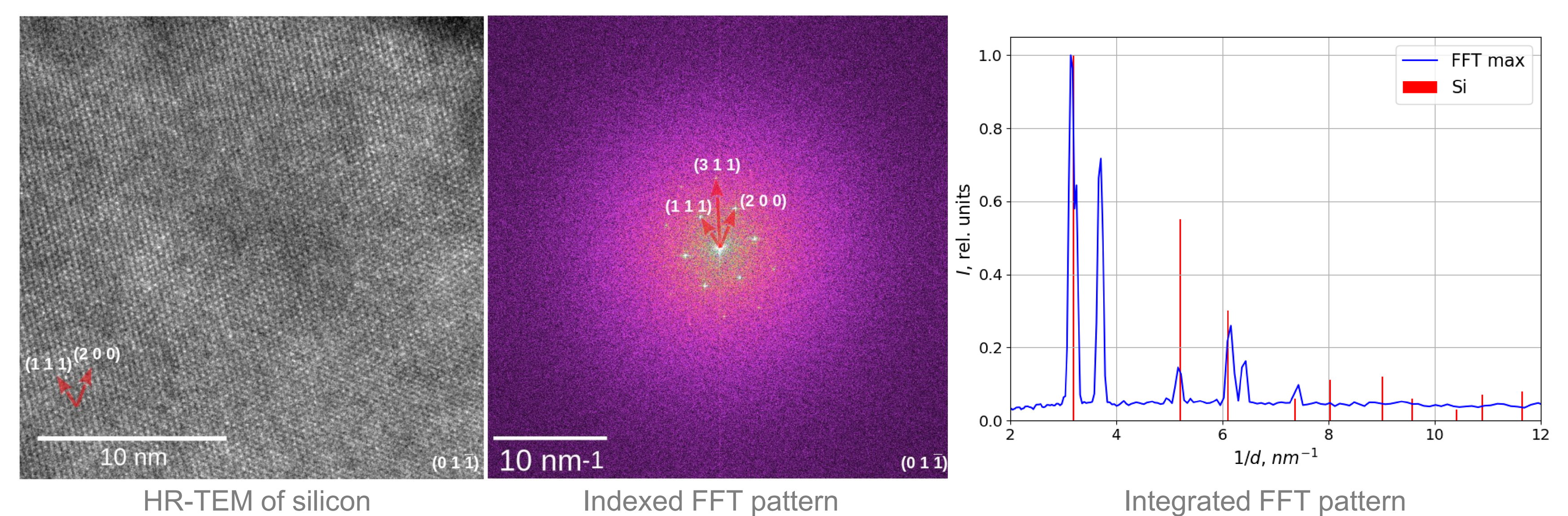
Gold nanoparticles
TiO_2 nanoparticles

TEM imaging: Film thickness measurements



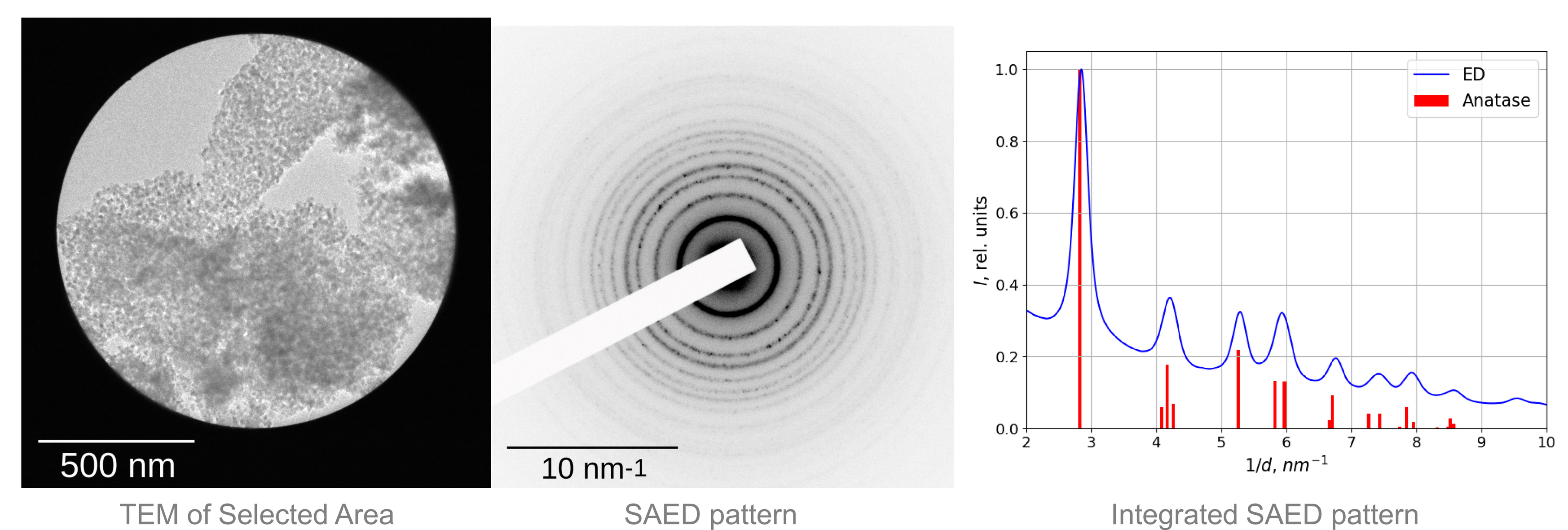
Thin film on silicon

High Resolution TEM



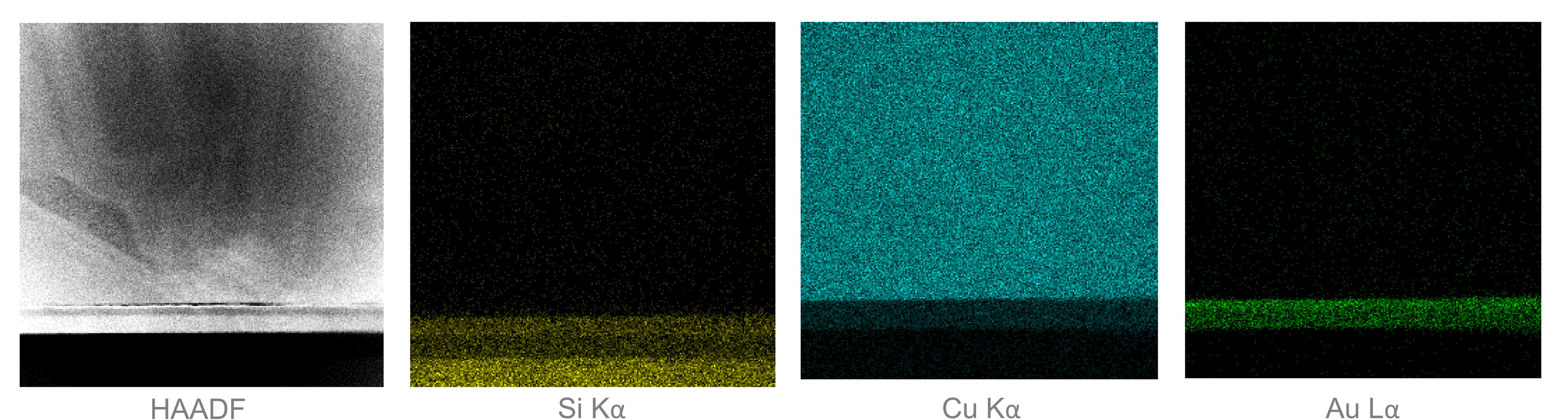
HR-TEM of silicon
Indexed FFT pattern
Integrated FFT pattern

Electron diffraction



TEM of Selected Area
SAED pattern
Integrated SAED pattern

STEM-EDX



HADF
Si Kα
Cu Kα
Au Lα

Raw images kindly provided by Luke Guinane and Prof. Tofail Syed

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