SPACE – COMPONENTS

	CHALLENGES	SOLUTIONS
Chemical Analysis /Spectroscopy	▪ Detection and quantification of impurities ▪ Optical transmission/reflection ▪ Surface height/roughness; accuracy of manufacturing steps	✓ Fourier Transform Infrared Analysis ✓ Ultraviolet Visible Spectroscopy ✓ Atomic force Microscope
Device / Internal Analysis	▪ Visible inspection of defects/failures ▪ Removal of organic compounds/surface cleaning ▪ Measurements of surface resistivity ▪ Long duration testing at AM0 ▪ Cross sectional analysis/imaging of small scale defects (<100nm) ▪ Depth profiling, identifying contaminants/impurities ▪ Surface cleaning, surface mapping of elements	✓ High Magnification Optical Microscopes ✓ Plasma Etcher ✓ Probe Stations for Device Characterisation ✓ Class 'A' solar simulator and light soakers ✓ Focussed Ion Beam/SEM ✓ TOF-SIMS
Electrical/ Electronic Test	▪ Resistivity measurements ▪ Permittivity calculations	✓ Agilent Femto-Amp resolution parameter analysers ✓ Automated Test Equipment
Environmental Testing	▪ Space qualification first article testing ▪ Accelerated weathering / UV degradation	✓ Outdoor test rigs for solar modules ✓ Weather station and irradiance sensor ✓ Environmental Chambers
Electron Microscopy/ Surface Analysis	▪ External visual inspection for cracks/failures/defects ▪ Elemental analysis ▪ Surface roughness of optical coatings ▪ Definition of bulk crystal structure ▪ Optical constants, non-destructive change to optical properties ▪ Film thickness calculations	✓ Field Emission Scanning Electron Microscopy ✓ Energy Dispersive X-ray Spectroscopy ✓ Atomic Force Microscopy ✓ X-ray Diffraction ✓ Ellipsometry ✓ Focussed Ion Beam(via partner)
Materials Processing	▪ Thin-film coatings ▪ Electrical contact/dielectric/AR coating ▪ Electrical contact/dielectric/AR coating	✓ Electron Beam deposition ✓ Thermal evaporation of metals, organic materials ✓ Class 1000 cleanroom
Non-Destructive Analysis	▪ Surface roughness of optical coatings ▪ Definition of bulk crystal structure	✓ Probe station, surface analysis equipment - AFM ✓ Probe station, surface analysis equipment - XRD
Electrostatic Testing	▪ Surface resistivity measurement ▪ Charge Decay monitoring ▪ Field Meter measurement ▪ Conduction to ground monitoring ▪ Powder coating test set	✓ Surface resistivity measurement ✓ Charge Decay monitoring ✓ Field Meter measurement ✓ Conduction to ground monitoring ✓ Powder coating test set
Software	▪ High Performance Computing access	✓ High Performance Computing access