

Validations Offered, Dec 2019

1.1. Structural characterisation Lateral size Flake morphology Phase identification (TMD materials, 1T / 2H) Defects/disorder	HR(S)TEM imaging
1.2. Structural characterisation Lateral size Flake morphology	SEM (including environmental (ESEM))
1.3. Structural characterisation Number of layers Lateral size Flake morphology	AFM
1.4. Structural characterisation Surface topography Roughness AFM at variable temperatures AFM in liquid Crystal structure BET equivalent surface area Texture measurements: preferred graphenic orientation studies in composites	AFM AFM, laser profilometry XRD Gas sorption analysis XRD
2.1. Chemical analyses Chemical composition Chemical bonding Qualitative amount of defects (GO) / impurities	XPS
2.2. Chemical analyses Chemical composition Chemical bonding - atomic configuration sp ² /sp ³ content (GO and rGO) Functionalisation studies	STEM -EELS
2.3. Chemical analyses Chemical composition	STEM -EDS
2.4. Chemical analysis Impurity	ICP -MS / ICP-OES / Fluo-X

2.5 Chemical analysis

XPS surface measurements
SIMS surface mapping
SIMS depth profiling
SIMS 3D imaging
Atomic force microscope infrared-spectroscopy (AFM-IR)

3.1. Mechanical properties

Type:
Elastic moduli, Poisson's ratio and strength
Tensile modulus
Tensile strength
Strain to break
Yield strength
Toughness
Compression modulus
Compression strength
Fatigue
Impact toughness
Fracture toughness
Hardness
Density
Vibration, acceleration
Interlaminar shear strength
Sound measurement

3.2. Mechanical properties

AFM nanomechanical properties
Nano/micro modulus, hardness and creep

4.1. Optical properties

Colour
Appearance
Transparency (visible light)
Reflectance (visible)
Refractive index

4.2. Optical properties

Scattering Scanning near-field optical microscopy (s-SNOM)
Confocal laser scanning microscopy

5.1. Thermal properties

Thermal conductivity (laterally)
 Thermal conductivity (thickness)
 Thermal resistance
 Thermal diffusivity
 Specific heat
 Enthalpy of fusion
 Glass transition temperature
 Thermal expansion
 IR radiative properties (emissivity, reflectance)
 Spectral directional emissivity
 Flammability testing

5.2. Thermal properties

Scanning thermal microscopy (SThM)
 Nano thermal analysis (nanoTA)

6.1. Electrical and magnetic properties

Electro-magnetic compatibility (EMC) tests
 Resistance (DC & AC)
 Capacitance (DC & AC)
 Inductance
 THz time-domain spectroscopy
 Resistivity, carrier density and mobility
 Electrical properties in variable environment
 Non-contact microwave resistance

Magnetotransport
 Magnetotransport

6.2. Electrical and magnetic properties

Piezoresponse force microscopy (PFM)
 Scanning Capacitance Microscopy (SCM)
 Scanning Kelvin Probe Microscopy (SKPM) (different modes)
 Scanning Kelvin Probe Microscopy (SKPM) in variable environment (gases, humidity, temperature)

7.1. Lifecycle (performance assessment over time and risk assessment link to the release of nanoobjects)

Thermal degradation (accidental combustion and incineration)
 Resistance of products under environmental impacts, weathering (%RH, T°C, UV, Corrosion)
 Accelerated ageing (%RH, T°C, UV, Corrosion, Pressure...)
 Wear and on-line characterization (number/concentration of particles, agglomeration/aggregation, shape, chemical composition, emitted gas)
 VOC emission