

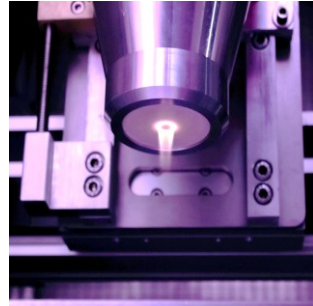
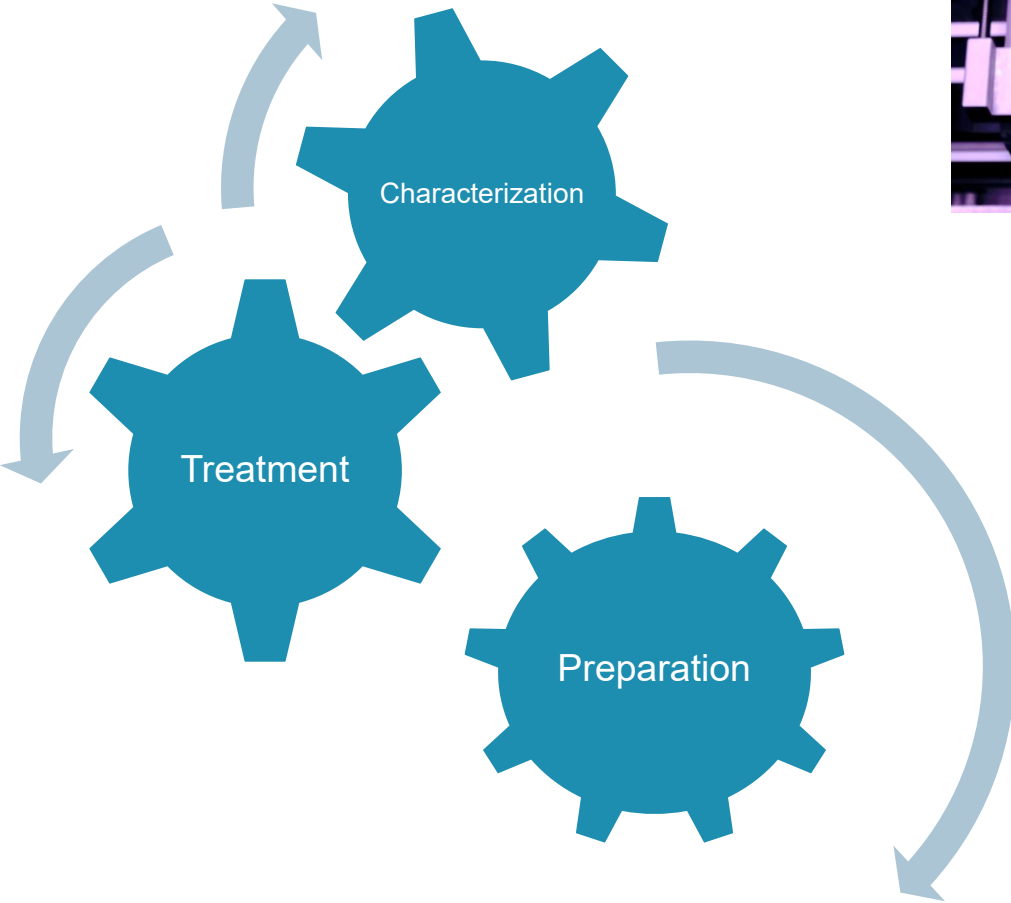
Liquids & gases as probes to characterize surface properties

David Seveno
Department of Materials Engineering

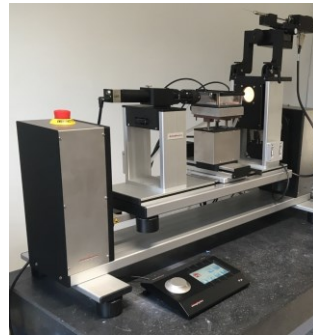
Surface treatment and characterization

“God made the bulk; surfaces were invented by the devil”

Nobel Laureate Wolfgang Pauli



Atmospheric Plasma



Drop And Surface Analyser



TODWA

Tensiometers



Zetameter



Inverse gas chromatography apparatus



3D optical profiler

Laboratory of complex surfaces & interfaces

www.mtm.kuleuven.be/equipment

Technical Equipment

Chemical processing and analysis

- › [Coulomat 702 SO/CS](#)
- › [Inductively Coupled Plasma Optical Emission Spectroscopy \(ICP-OES\)](#)
- › [Mass spectrometer for gas analysis](#)
- › [WD-XRF spectrometer Bruker S8 TIGER 4K](#)

Complex Surfaces & Interfaces

- › [3D Optical Profiler](#)
- › [Drop And Surface Analyzer \(DASA\)](#)
- › [Inverse Gas Chromatography apparatus](#)
- › [PlasmaSpot Mini](#)
- › [Ramé-hart cell](#)
- › [Solid Surface Zeta Potential Analyzer](#)
- › [Tensiometer](#)
- › [Thermo-Optical Dynamic Wetting Apparatus \(TODWA\)](#)

Electrochemical processing

- › [Centrifuge](#)
- › [Electrochemical measurements combined with xyz translation stage](#)
- › [Electrochemical filter-press reactor](#)
- › [Scanning Reference Electrode technique](#)
- › [Ultrasonic Processor](#)

Mechanical testing

- › [Biaxial tensile tester](#)
- › [Fatigue testing](#)
- › [Fragmentation test](#)
- › [Hardness tester machines](#)

Metal forming

- › [Rolling mill](#)

Microscopy

- › [Dual beam Nova 600 Nanolab](#)
- › [Electron Probe Microanalyzer JXA-8530F](#)
- › [Scanning electron microscope XL30 SEM and TSL orientation imaging microscope system](#)

Drop And Surface Analyzer (DASA)

The DASA is a fully-automated contact angle measuring system used to characterize the wetting properties of solids and liquids.

Key features

- › Software-controlled dosing unit and sample holder positioning (X-, Y-, and Z-axis)
- › High-performance lens (2.4µm/pixel)
- › USB camera (max. 2450 img/s)
- › Tilting unit
- › Turning table
- › High-temperature cell
- › Peltier cell
- › Advanced analyzing software

Sample type

	Powder	Fiber	Solid surface
Sample dimensions	Compressed powder (pellets) is possible	Min. Ø 7µm	Max. 100x100x10 mm ³

More information

If you would like to know more about this equipment, please contact David Seveno.

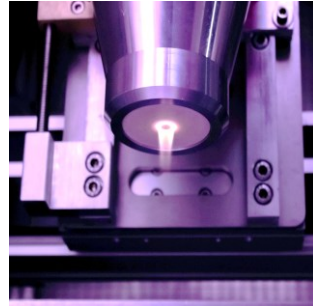
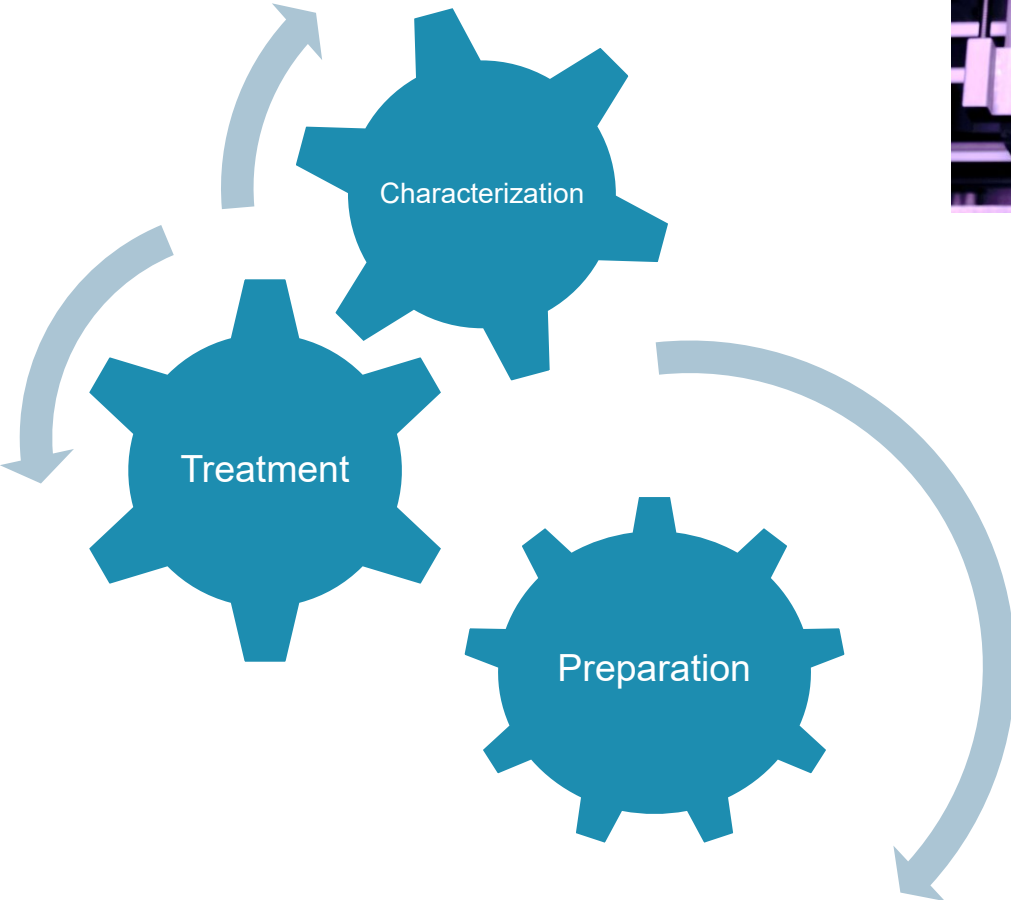
[contact](#)

Key features, Sample type, Working principle
Properties measured, Operating conditions,
References, Location, Contact point

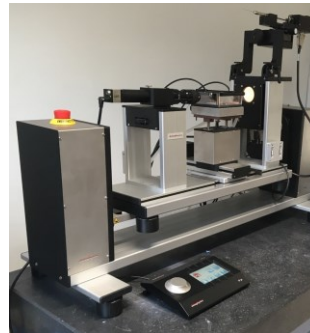
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TODWA

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Zetameter



Inverse gas chromatography apparatus

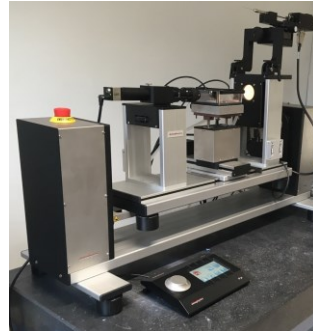
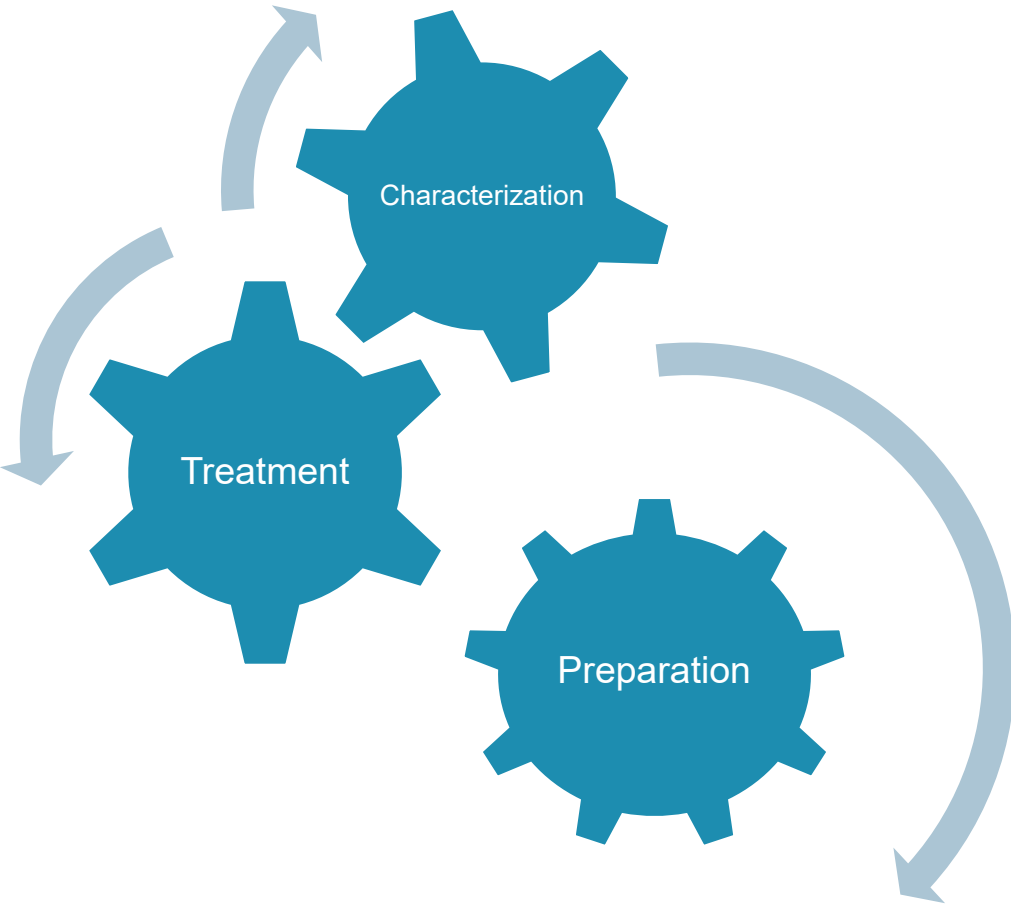


3D optical profiler

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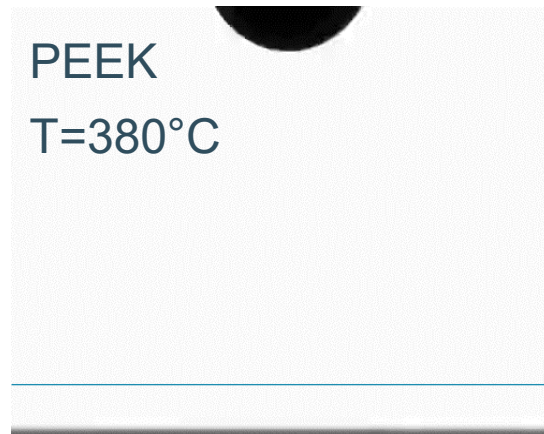
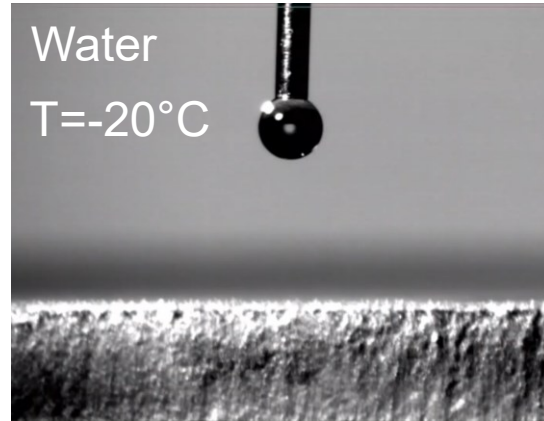
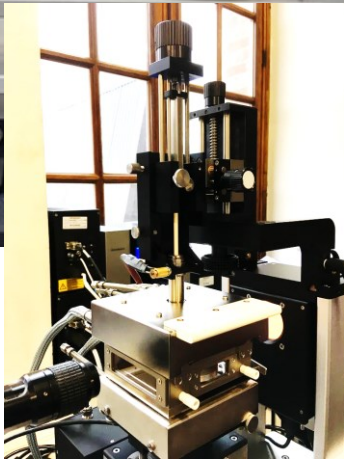
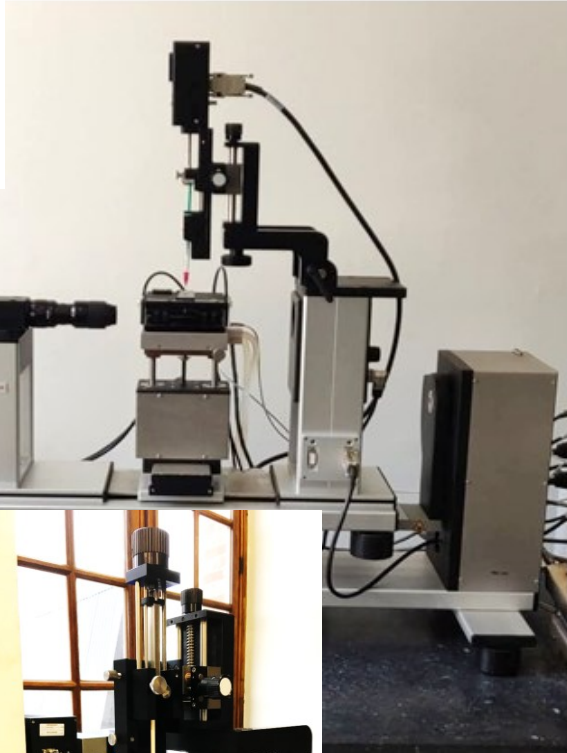
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**Drop And
Surface
Analyser**

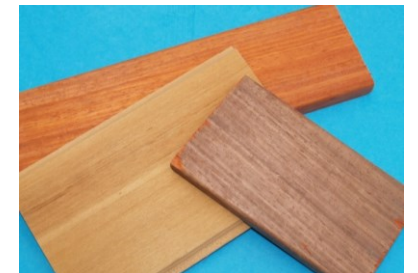
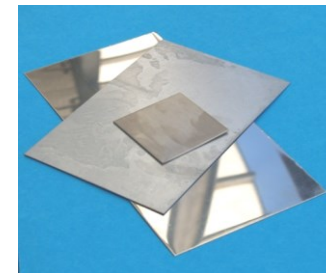
Surface characterization

Drop And Surface Analyser



- Contact angles (static & dynamic)
- Surface tension & Surface energies
- Wetting hysteresis
- Tilting angle
- Absorption dynamics
- Evaporation dynamics

- $-20^{\circ}\text{C} < T < 700^{\circ}\text{C}$
- Relative humidity controlled
- “Flat” surfaces, $10 \times 10 \text{ cm}^2$

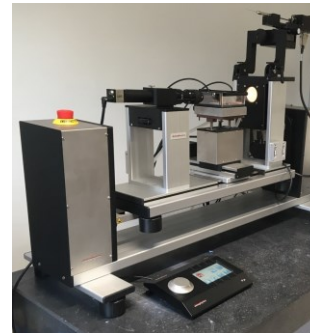


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Tensiometers



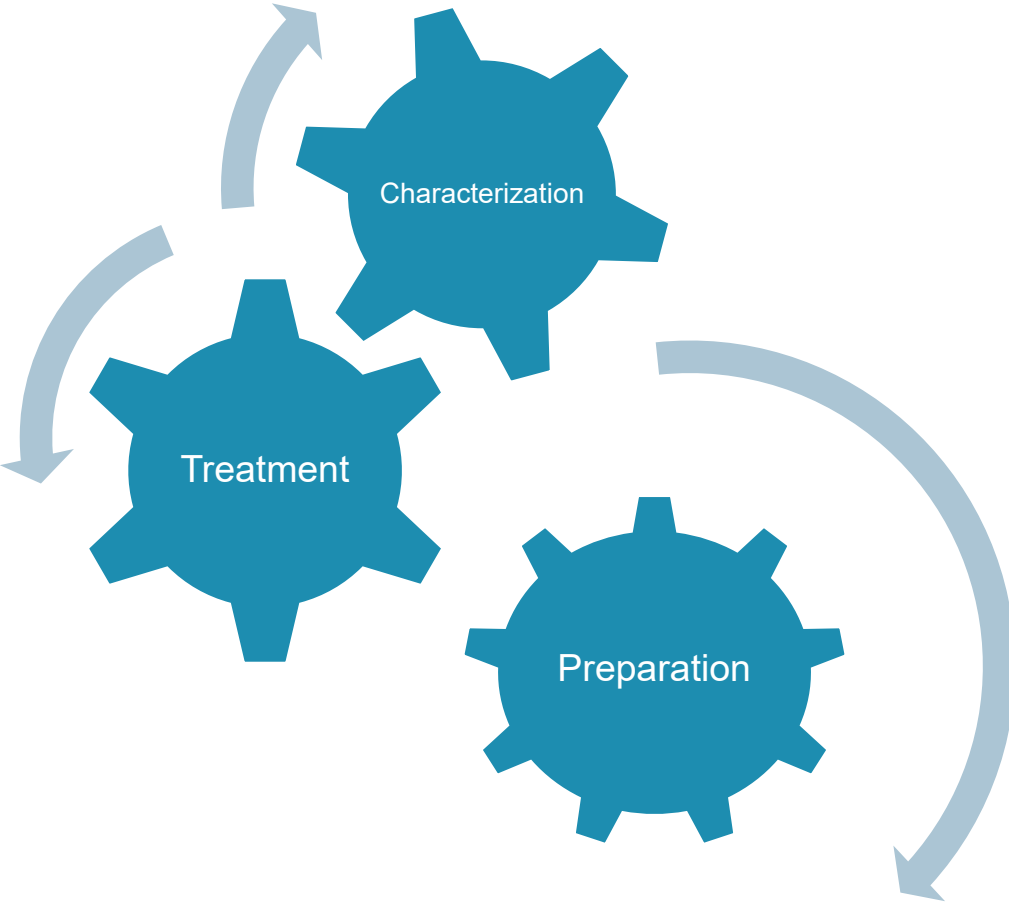
Drop And
Surface
Analyser



Inverse gas
chromatography
apparatus

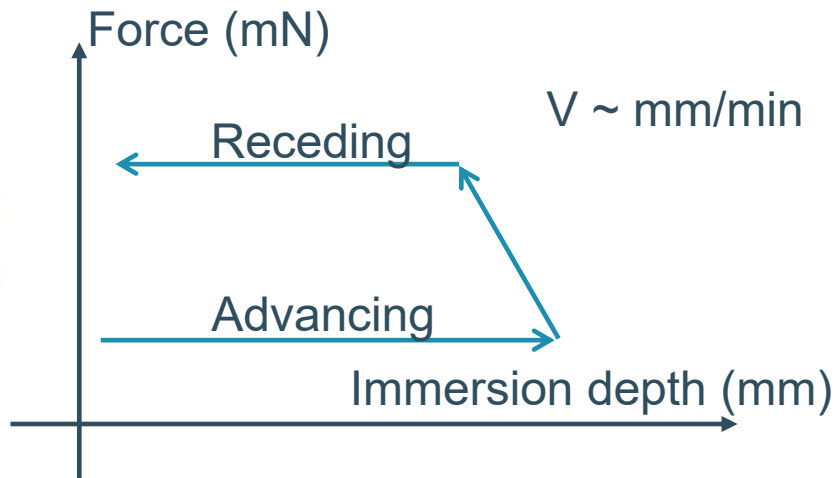
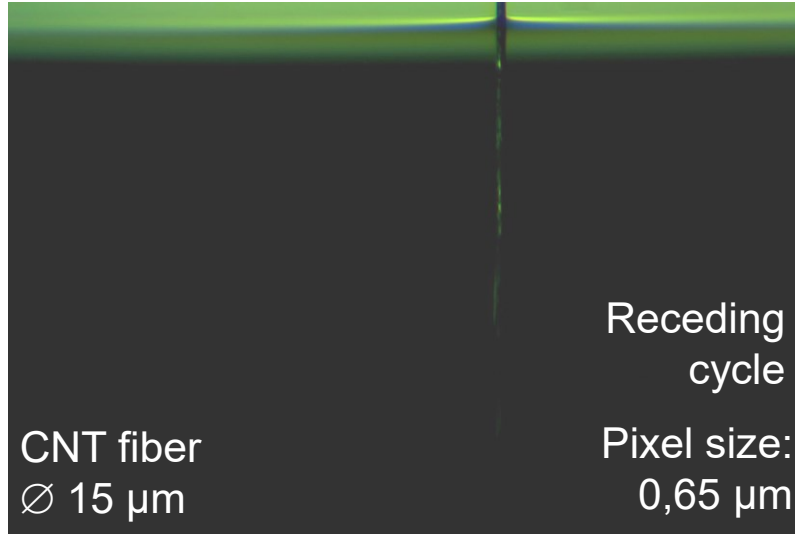


TODWA



Surface characterization

Tensiometers



- Contact angles (static & dynamic)
- Surface tension & Surface energies
- Wetting hysteresis
- Wicking processes
- Absorption dynamics
- $-20^{\circ}\text{C} < T < 250^{\circ}\text{C}$
- Relative humidity controlled
- Fibers, Plates, Fibrous & porous materials

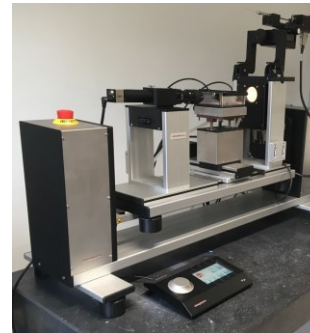


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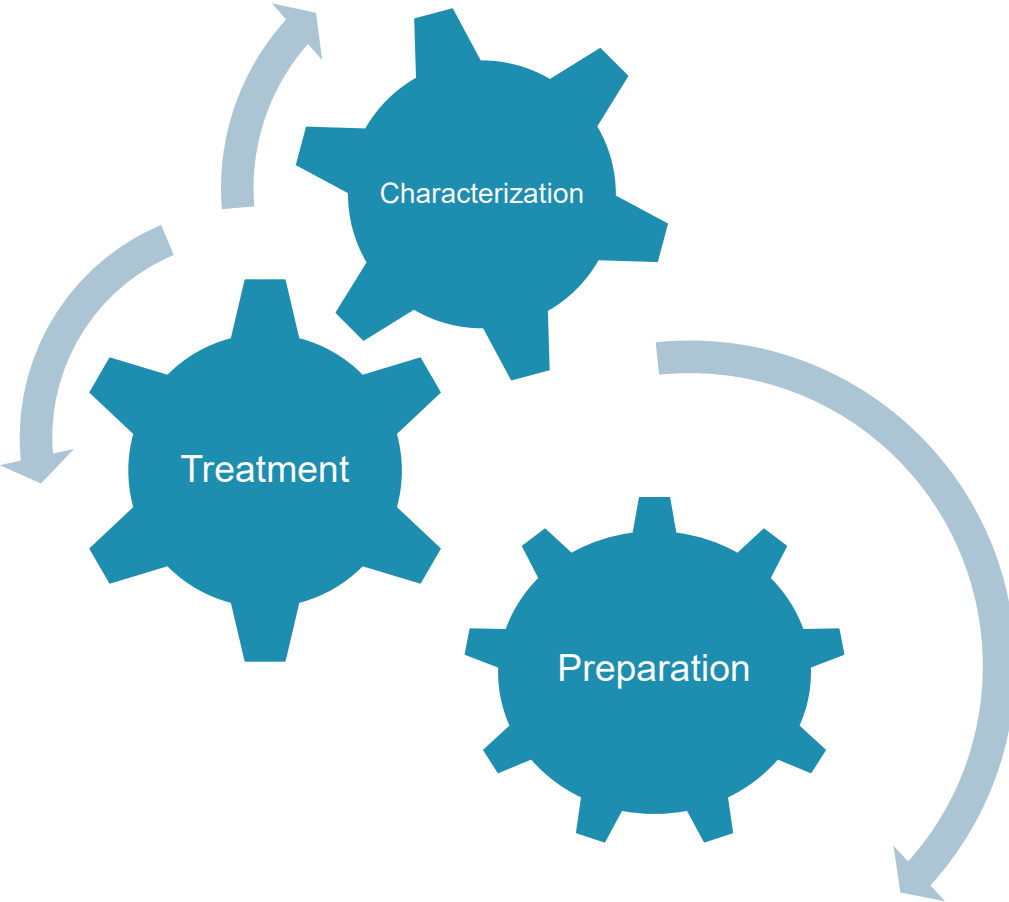
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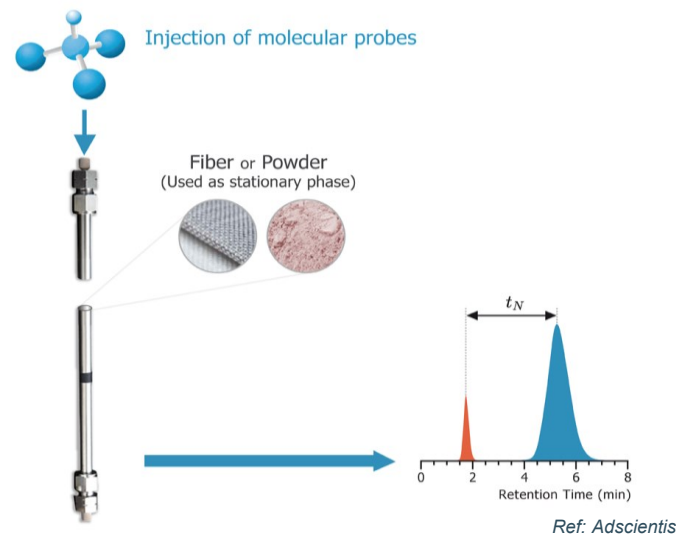
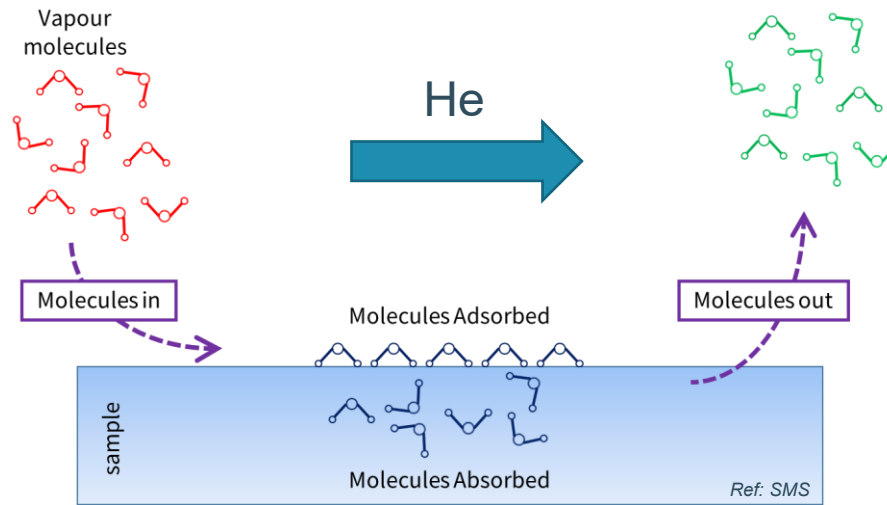
TODWA



Surface characterization



Inverse gas chromatography apparatus



- Retention time
- Free energy of adsorption
- Dispersive surface energy component
- Surface polarity
- Adsorption isotherms
- Surface Specific Area (BET)
- Diffusion coefficient
- $RT < T < 400^\circ\text{C}$
- Relative humidity controlled
- Fibrous & Porous materials

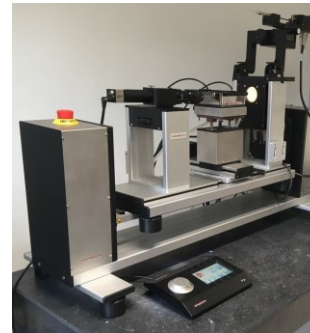


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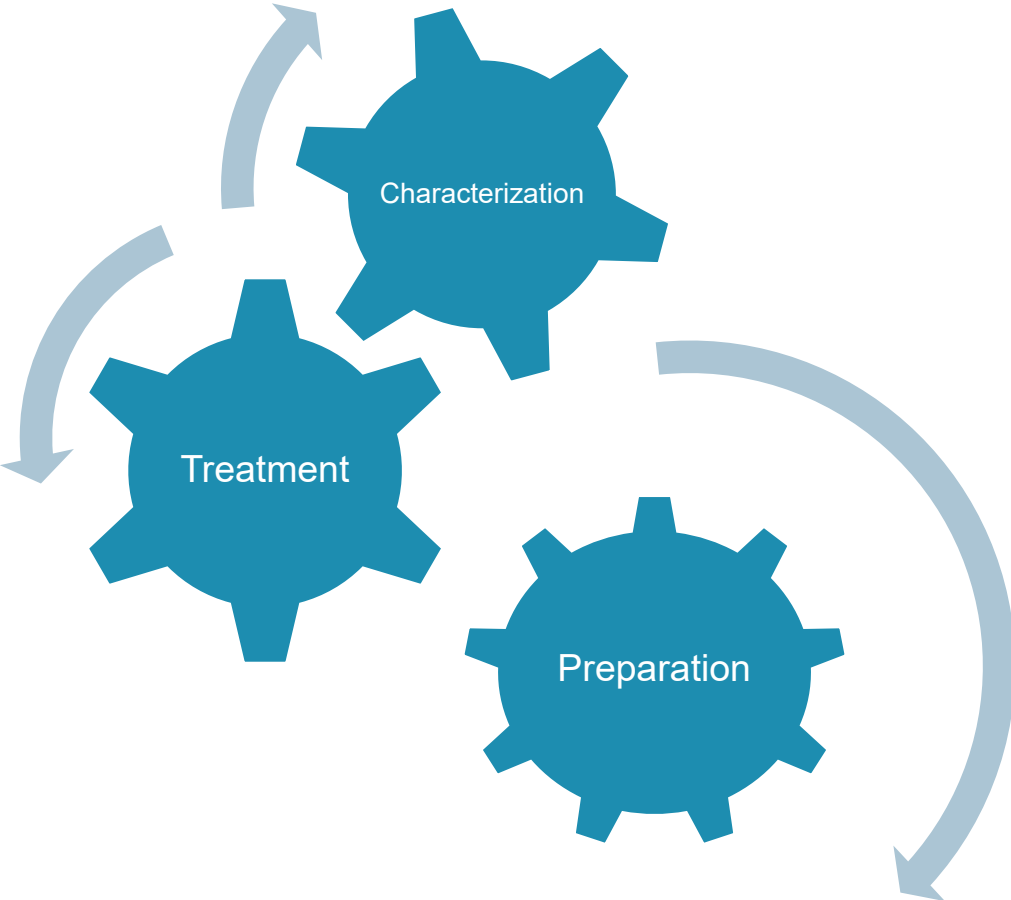
Drop And
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Analyser



Inverse gas
chromatography
apparatus

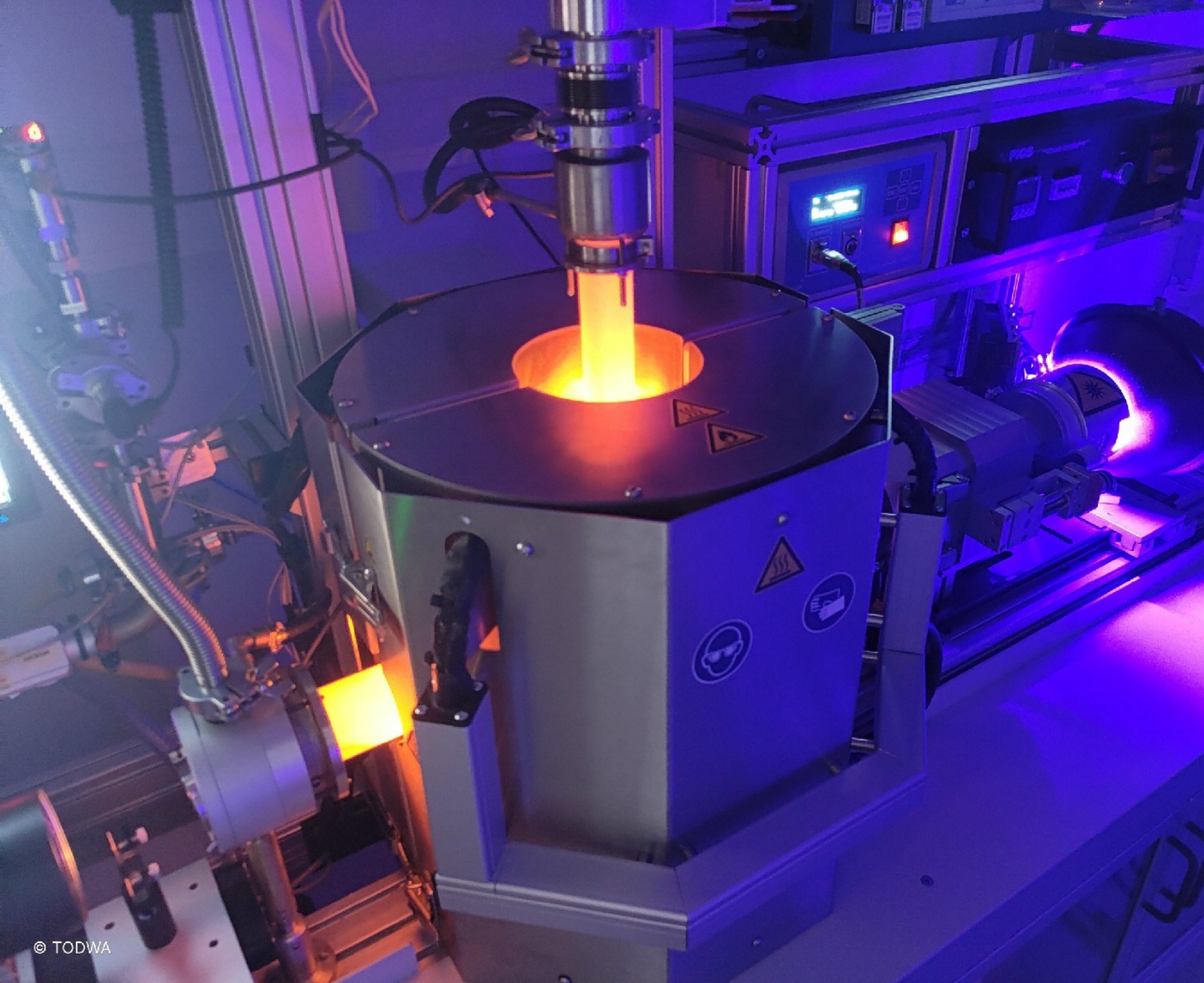
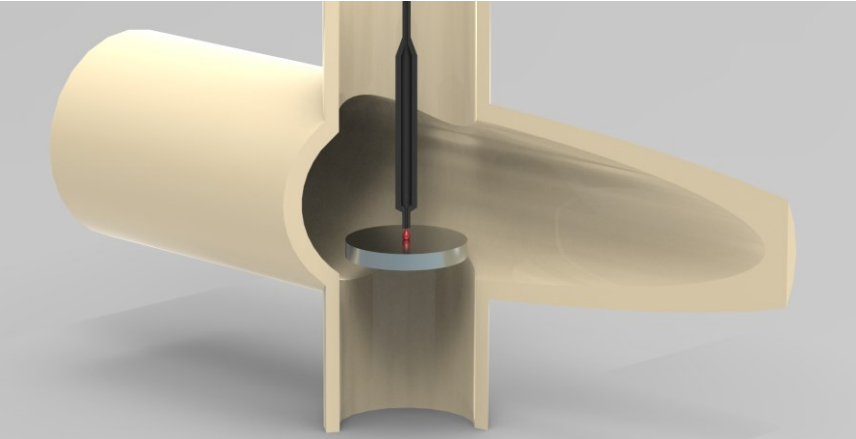


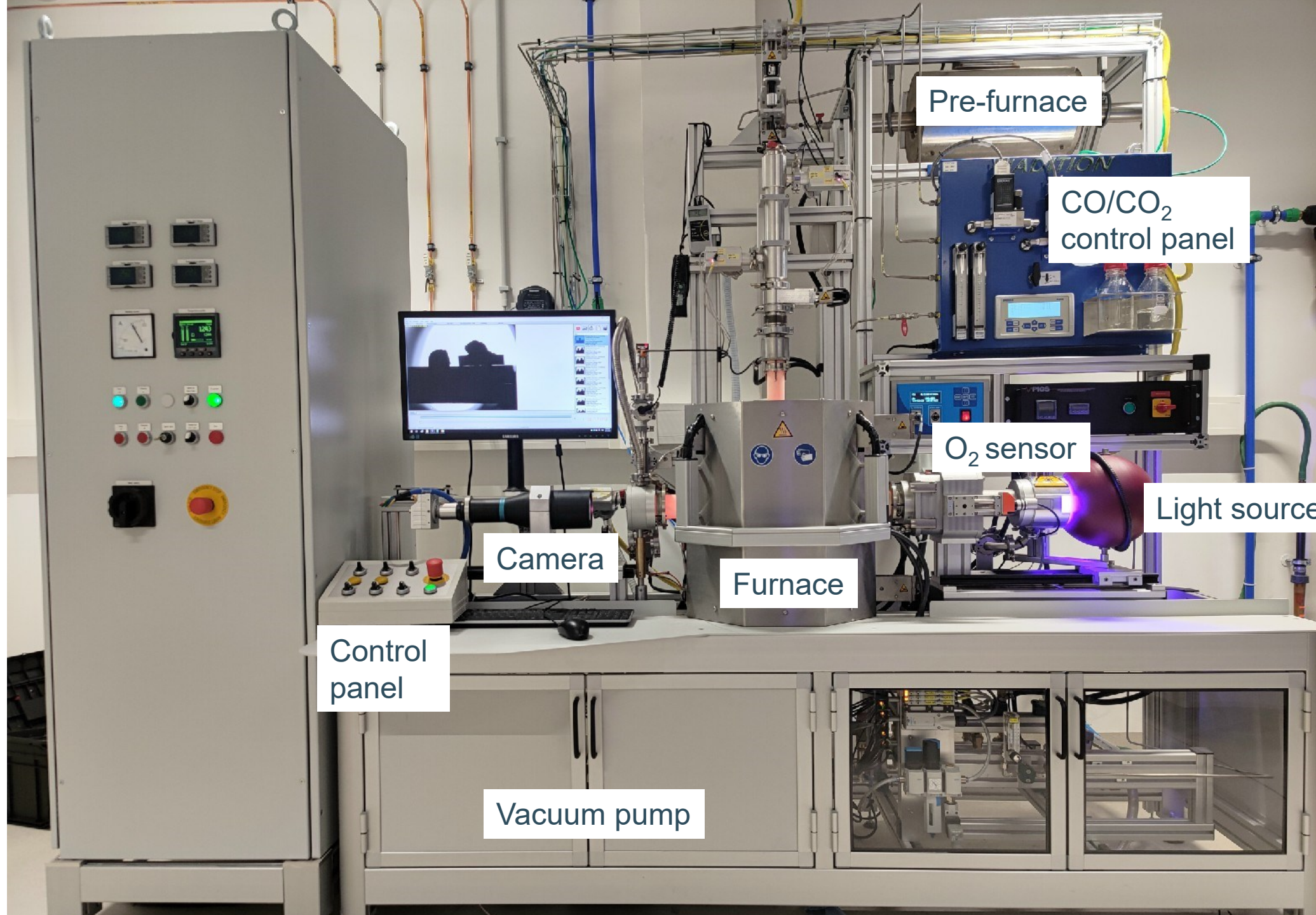
TODWA



Surface characterization

Thermo-optical dynamic wetting apparatus





Pre-furnace

CO/CO₂
control panel

O₂ sensor

Light source

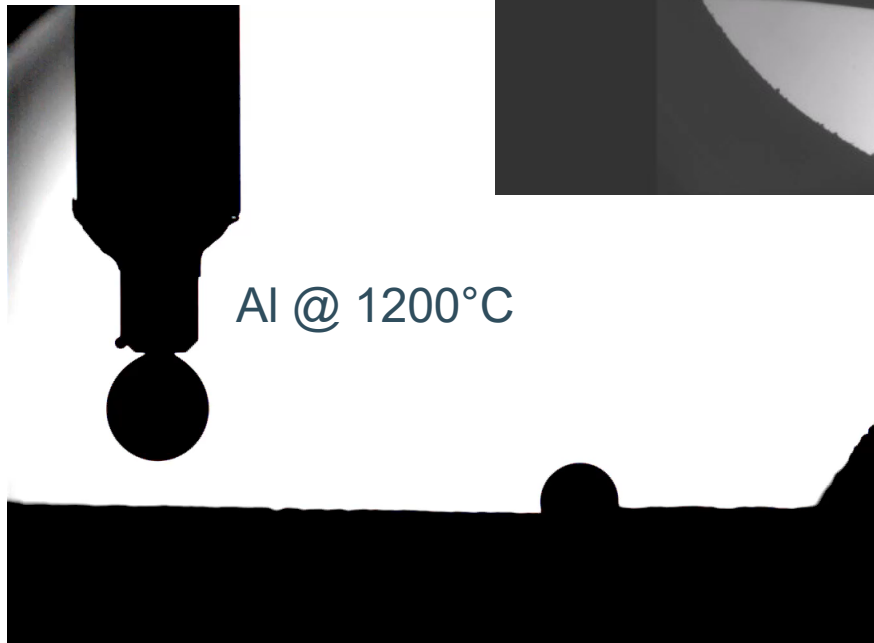
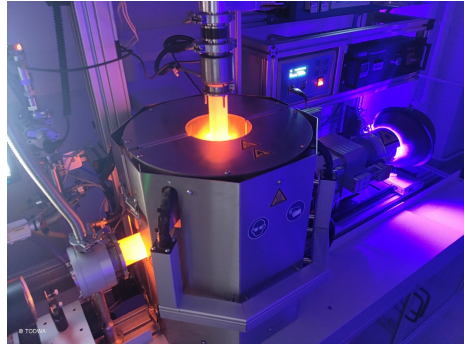
Camera

Furnace

Control
panel

Vacuum pump

Surface characterization

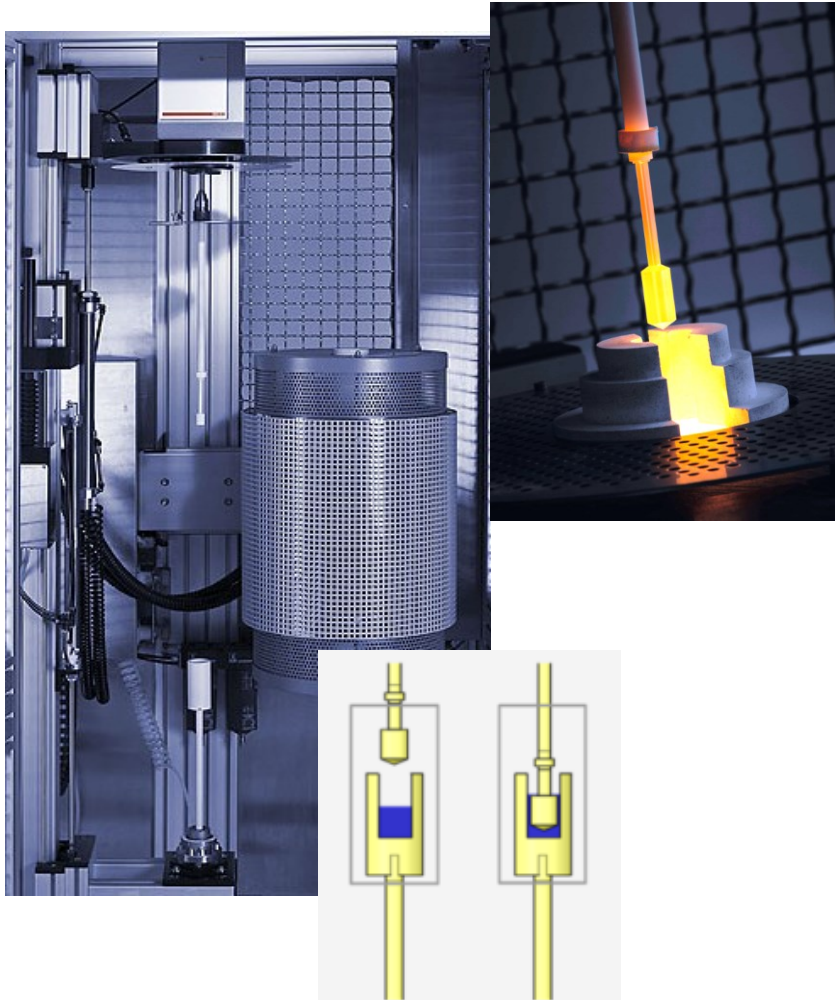


- Contact angles (static & dynamic)
- Surface tension
- Wetting hysteresis
- Tilting angle
- Softening & Melting behavior
- Shape evolution

- $RT < T < 1700^{\circ}\text{C}$
- Heating rate: $5^{\circ}\text{C}/\text{min}$
- PO_2 controlled ($>10^{-18}$ ppm)
- Vacuum (10^{-4} mbar)

Liquid characterization

FRS1800 rheometer



- Liquid density
- Melting temperature
- Viscosity between 0.001 & 10^8 Pa.s

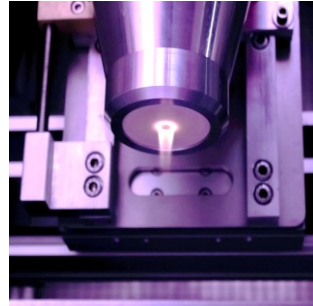
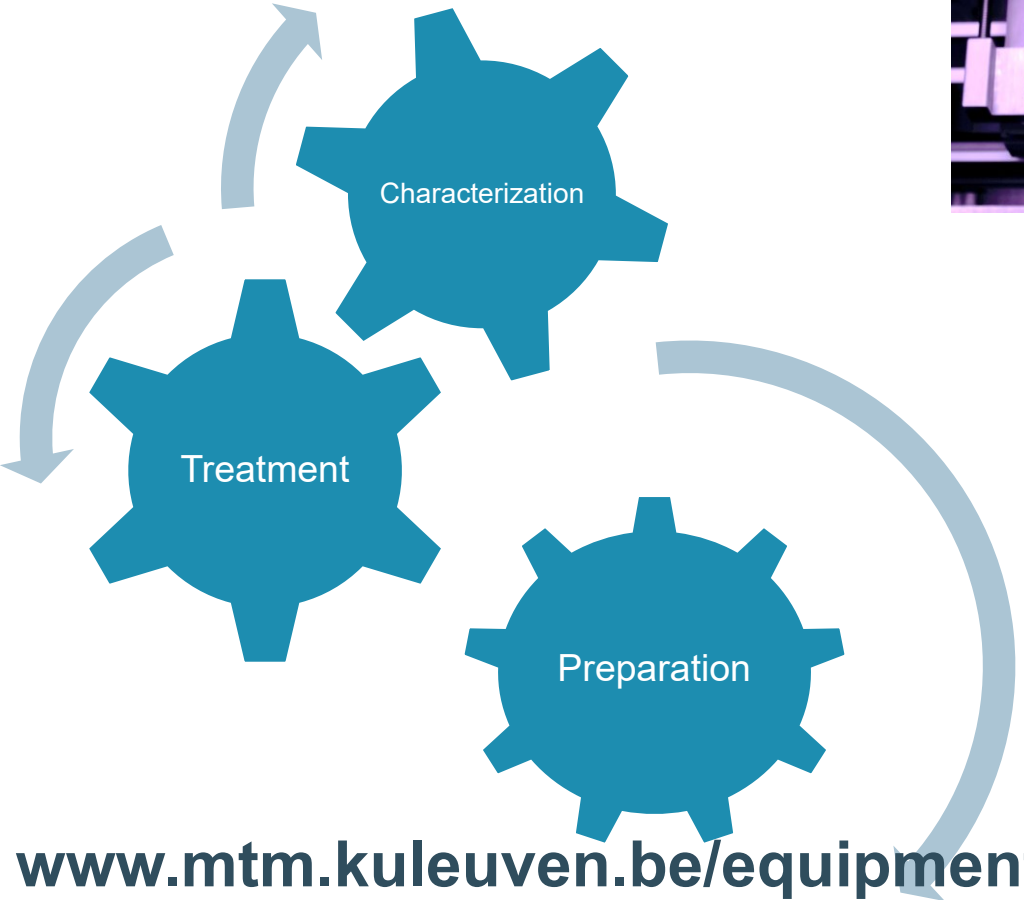
- up to 1750°C
- Atmosphere controlled (PO_2)
- Fast heating (30°C/min)
- Rotation speed from 10^{-7} to 300 rpm

Contact point: Muxing Guo

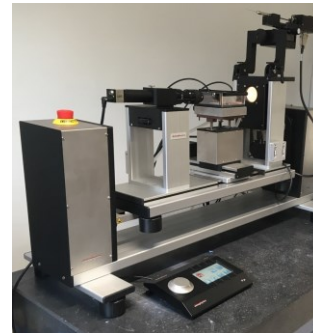
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