LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

ADVANCED CHARACTERIZATION PLATFORM

The Advanced Characterization Platform is equipped with a wide range of cutting-edge instruments. Standard and tailored methodologies are used to investigate elemental or molecular composition and quantification, structure identification, topography, morphological characterization and to perform 2D/3D Imaging.

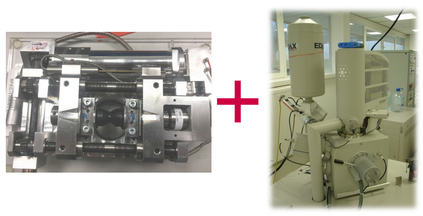
Structure and Morphology {TEM, SEM, Tomo, XRD}

Reverse Engineering {HRMS, NMR, LC/SEC}

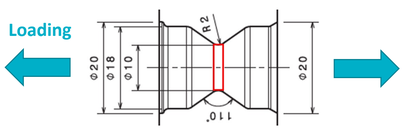
Research & Activity Fields

Imaging From µm to nm 2D/3D

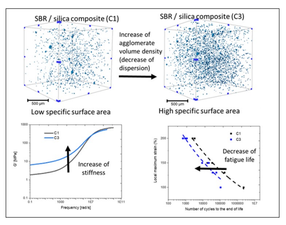
Structure & Morphology

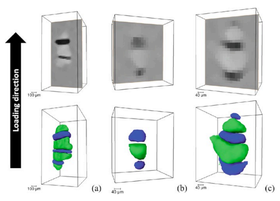


Influence of Silica Specific Surface Area on the Viscoelastic and Fatigue Behaviors of silica-filled SBR composites

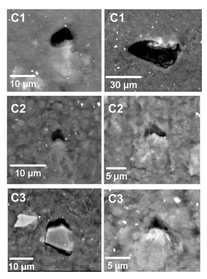


Identification of crack initiated sites on strained hourglass sample





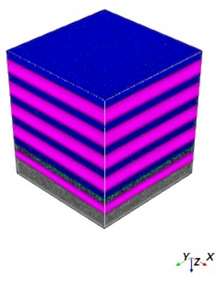
Crack initiation sites by tomography (Federico et al. Polymers, 2021)



Crack initiation sites by SEM (Padmanathan et al. Polymers, 2021)

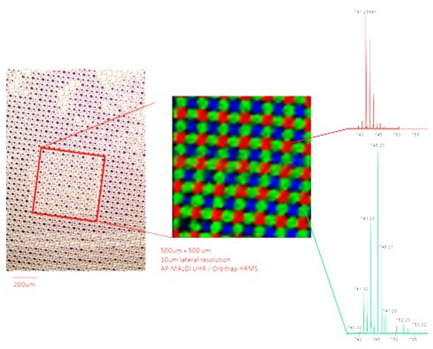
2D/3D imaging

TOFSIMS multilayer 3D imaging



TOFSIMS 3D reconstructed data cube. Alternating ZnO/Al2O3 ALD layers (5x50nm each). Hydrocarbon contamination is detected in a specific interlayer.

AP-MALDI Orbitrap imaging



- Part of a broken smartphone display
- **10-micron lateral** resolution APMALDI UHR imaging with Orbitrap detection

- AP-LDI / Orbitrap:

→ Exact m/z measurement (<1ppm)

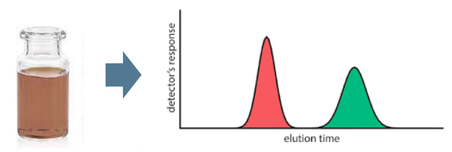
→ MS/MS confirmation

→ Identification of degradation products

Reverse Engineering

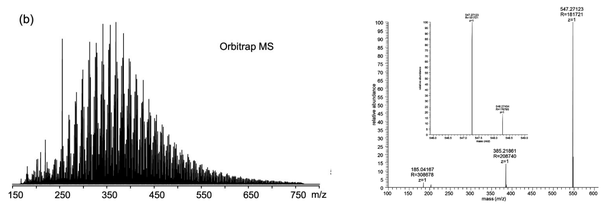
Multi-mode Chromatography

Sample containing A+B



Chromatographic separation (hydrophilicity, hydrophobicity, size exclusion)

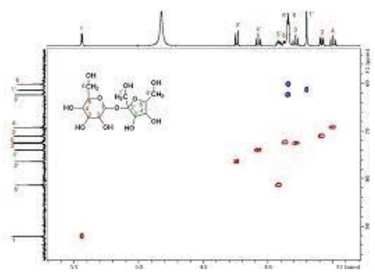
High resolution Mass spectrometry



High resolution mass spectrometry (Orbitrap) identification of individual ingredients (exact m/z + structural analysis by MSMS) for oligomers and small molecules

Nuclear Magnetic resonance

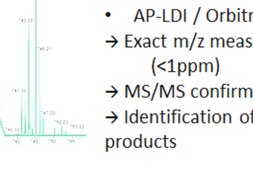
Comprehensive structural analysis of molecular structures. Example of two-dimensional (2D) HSQC with proton (1H) and 13C



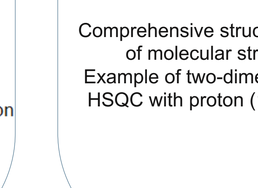
From micro to nano- imaging

Wood

Functionalized microcarriers (beads of Polymer)



Detection of functionalization on highly topographic/insulating samples



2 phases polymer

Catalyst on nanowires

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