

# 14<sup>th</sup> BESSY@HZB User Meeting

## December 8<sup>th</sup>, 2022

### INVITED SPEAKER

Public Lecture  
Energy Conversion  
Energy Storage  
Information Technology  
Life Science & Health  
Life Science & Health@MX  
Matter & Material  
4000<sup>th</sup> Protein Structure@MX

Seth R. Marder (CU-Boulder/NREL, US)  
Jan Niklas Hausmann (TU Berlin, DE)  
Sven Hampel (TU Clausthal, DE)  
Lourdes Marcano (UPV/EHU, ES)  
Nils Schuth (Cinvestav, MX)  
Friederike Füsser (Uni Münster, DE)  
Mayara da Silva Santos (HZB, DE)  
Christian Meyners (TU Darmstadt, DE)

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Poster Session

Poster Slam

Vendor Exhibition

**Upgraded imaging capabilities at the BAMline**

Henning Markötter (Bundesanstalt für Materialforschung und -prüfung, Germany)

*BAMline*

A recent upgrade of key equipment of the BAMline widens its imaging capabilities: shorter scan acquisition times are now possible, in situ and operando studies can now be routinely performed, and different energy spectra can easily be set up. In fact, the upgraded double-multilayer monochromator brings full flexibility by yielding different energy spectra to optimize flux and energy resolution as desired.

**Surface modification of polyhydroxybutyrate (PHB) by angle-dependent O<sub>2</sub> plasma treatment**

Lukas Beucher (Universität Koblenz, Germany)

*HE-SGM*

The O<sub>2</sub>-plasma treatment of biodegradable PHB, previously thought to be a cleaning process, alters surface properties. Similarly, the angle of incidence of the plasma-enhanced chemical vapour deposition to the sample surface affects the parameters such as contact angle, water vapor permeability, and chemical composition.

**Occurrence of persistent environmental pollutants in freshwater**

Luisa Jordao (Instituto Nacional de Saude Dr Ricardo Jorge, Portugal)

*IRIS*

Freshwater pollution is a huge concern. Occurrence of 2 groups of persistent pollutants with similar chemical properties (polycyclic aromatic hydrocarbons and microplastics) in Alqueva's surface water were evaluated during 2021. Samples were collected, once per season, at 3 spots related to touristic activities. Biofilm presence on plastic and natural materials was monitored and compared.

**RIXS at PEAXIS - Determining the Electronic Structure of Solid-State Energy and Quantum Materials**

Christian Schulz (Helmholtz-Zentrum Berlin, Germany)

*U41-PEAXIS*

Materials for energy and quantum applications benefit from their complex electronic structure. PEAXIS provides RIXS spectroscopy which is ideally suited to study electronic structure and dynamics of these materials. PEAXIS offers various features which allow to study electronic properties in a wide temperature range, with applied voltages and under continuous motion for X-ray sensitive samples.

**Developments in sample preparation, handling, and storage in cryoEM**

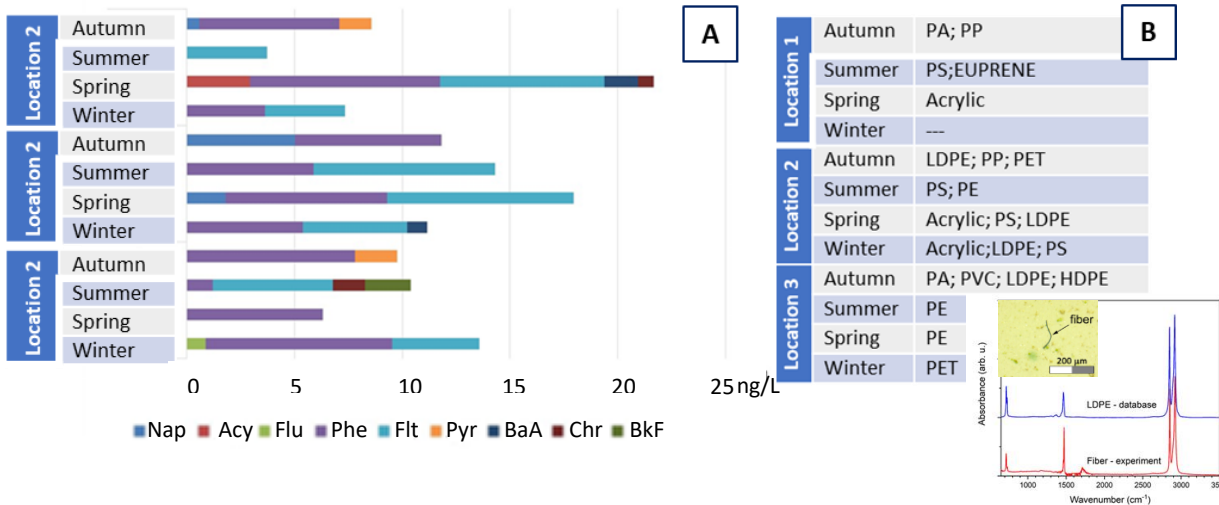
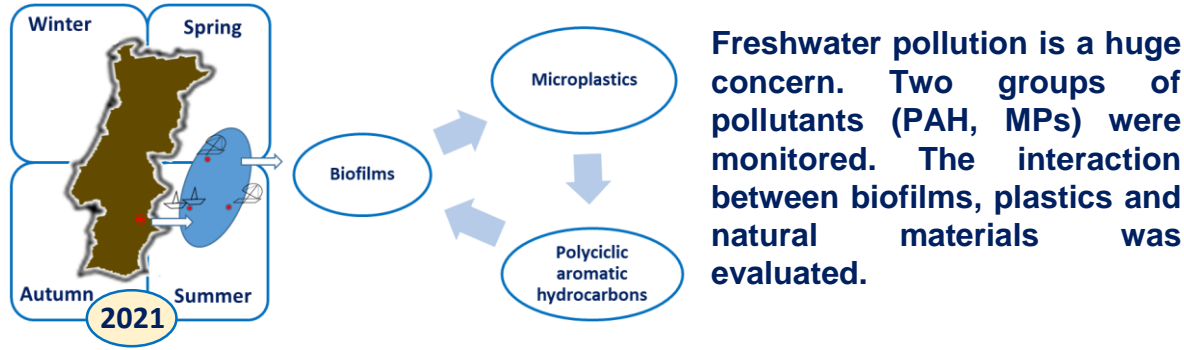
Joyce Frank (MiTeGen, Ithaca, US)

Interest in cryoelectron microscopy (cryoEM) is growing rapidly as technical advances in electron detectors and optics dramatically improve imaging capabilities and sample throughput. Systems for the advanced storage, transport, and tracking of cryo-EM samples are being developed. We report on our current and planned developments in this area.

# Occurrence of persistent environmental pollutants in freshwater.

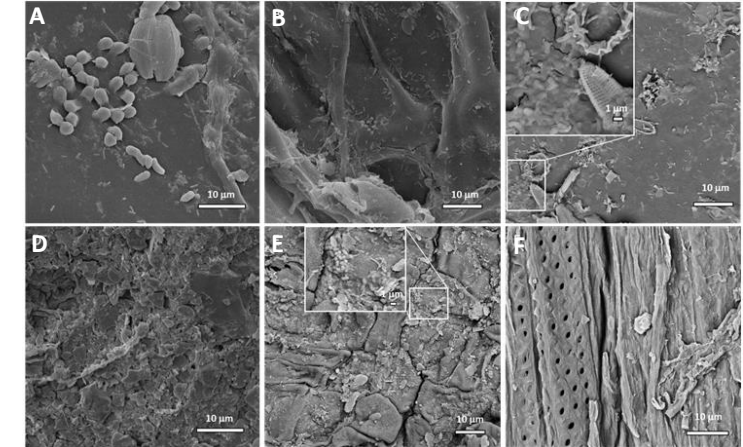
LUISA JORDAO/ NATIONAL INSTITUTE OF HEALTH DR. RICARDO JORGE (INSA), LISBOA, PORTUGAL

## Project Summary



**Figure 1. Distribution of Polycyclic Aromatic Hydrocarbons (PAHs) and microplastics (MPs).**

PAHs concentrations (A) and MPs (B) occurrence at the 3 different spots were determined. PA (polyamide), PE (polyethylene), LDPE (low density PE), HDPE (high density PE), PET (polyethylene terephthalate), PS (polystyrene), PP (polypropylene), PVC (polyvinyl chloride), Nap (naphthalene), Acy (acenaphthylene), Flu (fluorine), Phe (phenanthrene), Flt (fluoranthene), Pyr (pyrene), BaA (benzo[a] anthracene), Chr (chrysene), BkF (benzo[k]fluoranthene).



**Figure 2. Biofilms on environmental samples.**

Biofilms assembled on different plastic polymers: LDPE (A), PS (B), PP (C) and natural materials such as stone (D) and vegetal samples (E, F) were monitored by scanning electron microscopy.

## Project Impact

- 3.7 < [PAHs] total < 21.7 ng/L, with a predominance of 2, 3 and 4-ring compounds, suggesting that the atmospheric deposition and petroleum contamination were the major sources.
- MPs were found at all locations during the study.
- Plastic colonization by microbial biofilms was observed and should be studied to evaluate the viability of their use as a bioremediation strategy for environmental persistent organic pollutants.

## Co-authors/institutions

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 Alexander Veber: Humboldt Universität zu Berlin, Berlin, Germany  
 Ulrich Schade and Ljiljana Puskar: Helmholtz Zentrum Berlin für Materialien und Energie, Berlin, Germany  
 Carla Ferreira (INSA) for her help during the sampling campaigns.

**MPs and PAHs are persistent organic pollutants and biofilms can play a role in their bioremediation.**