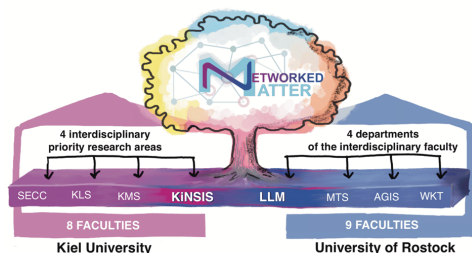
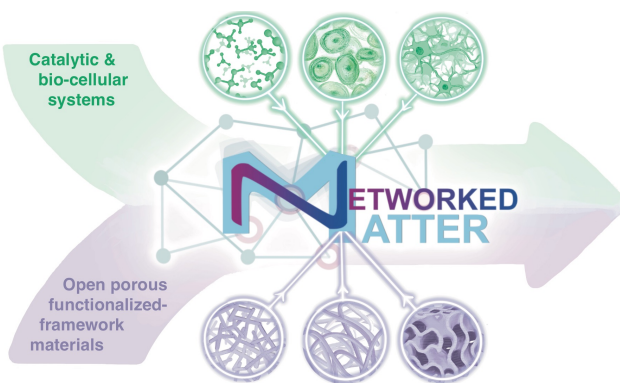


# DFG Transregio-Initiative NetMat

Networked Matter: Open Porous Functionalized-Framework Materials to harness Dynamic Complex Systems



Kiel University and the University of Rostock are embarking on a long-term partnership based on their structural similarity in their approach to **interdisciplinary science**. Rostock introduced the novel **interdisciplinary faculty** with four departments. Similarly, Kiel has defined four **interdisciplinary priority research areas**. **Networked Matter** is at the heart of this development, combining the strengths of the **Life, Light and Matter** department in Rostock and the **Kiel Nano, Surface and Interface Science** research area in Kiel.



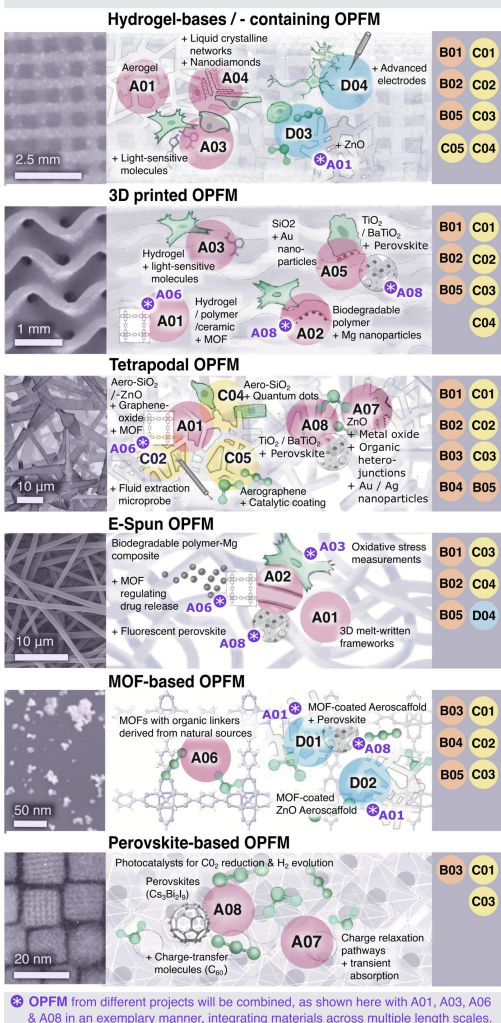
## The proposal in numbers

- 22 scientific projects (4 additional central projects)
- 4 project areas
- 40 Principal Investigators involved based at UR, CAU, UMR, UKSH, LIKAT, Hereon, IPN, TUHH
- 33% share of women
- 40 new scientific positions are planned
- 14.1 M€ requested budget
- Draft proposal submitted in January 2025
- Consultation interview planned in summer 2025
- Decision for full proposal expected in November 2025

## Idea, structure and integration of projects

**Networked Matter (NM)** is a novel concept which will be pursued in **NetMat** to enable precise control over complex, dynamic systems in catalysis and bio-cellular environments. These systems – comprised of interacting fluids, reactions, and living cells – are hosted in **Open Porous Functionalized-Framework Materials (OPFM)** that provide space, structure, and tuneable functionality. By integrating nanoscale coatings, sensor elements, and active control mechanisms, **NetMat** aims to create intelligent material systems that are locally interactive and globally responsive. This highly interdisciplinary effort combines materials science, chemistry, biology, mathematics, and physics to lay the foundation for future applications in sustainable chemistry, biomedicine, and biohybrid technologies.

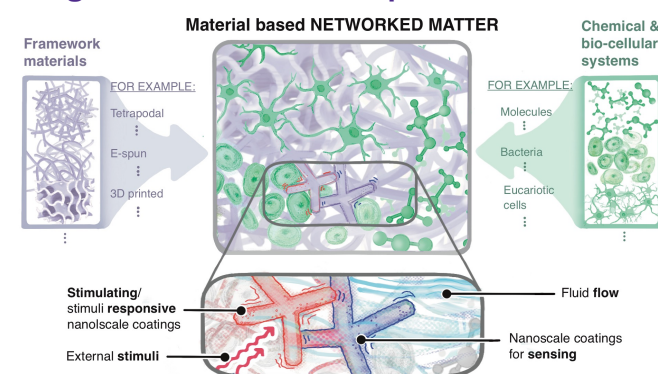
### OPEN POROUS FUNCTIONALIZED-FRAMEWORK MATERIALS (OPFM)



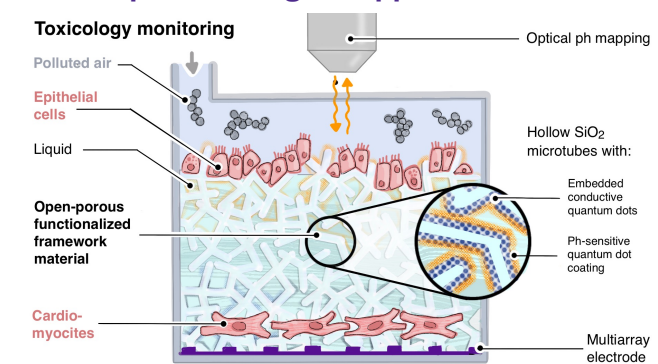
### PROJECTS

- A01 Additive manufacturing & self assembly
- A02 Degradable metal composites
- A03 Light-responsive biohybrid frameworks
- A04 Light-responsive frameworks for adaptive cell culture
- A05 Locally functionalized ceramic networks
- A06 Host-guest-guest networks for small molecule separation
- A07 Functionalizing frameworks for light-harvesting in catalysis
- A08 Networked perovskites for photocatalysis
- B01 Multilevel modelling of inflammatory response
- B02 Image-based multiscale & multiphysics
- B03 Modelling catalytic reactions via neuronal networks
- B04 Catalyst optimisation via structure-property relationship models
- B05 Modelling functional path & flows in dynamic networks
- C01 Imaging conductivity dynamics & topology
- C02 Microprobe mass-spectrometry
- C03 X-ray tomography & spectroscopy
- C04 AeroLungHeart: In vitro toxicology monitoring
- C05 Aeromaterials for analytics (fast PFAS detector)
- D01 CO<sub>x</sub> to MeOH: Stimulated hydrogenation catalysis in liquid phase
- D02 High performance Pd-catalysis
- D03 Biohybrid materials for light-driven biocatalysis
- D04 Advanced electrode design for adaptive neuronal stimulation

## The general material concept



## An example of biological application



## An example of application in catalysis

