University of Antwerp
Insuschem | IOF-Consortium

# Laboratory of Adsorption and Catalysis (LADCA)


Department of Chemistry

Prof. Vera Meynen and Prof. Pegie Cool

# Key research topics : General focus

**Materials characterization** **Properties-performance correlation**

**Wide range of materials syntheses & modification**

inorganic
organic-inorganic (hybrid)
(non-)porous materials
…

**Applications**

Sorbents
Membranes
Innovative material sector
*(photo), (electro) (plasma) catalysis*
$CO_2$ conversion
…

**Insights in synthesis control**

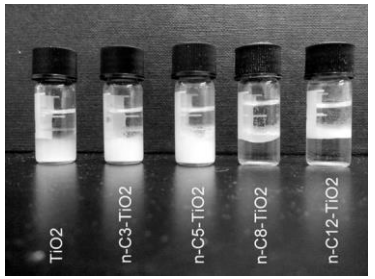
**Insights in key properties for application**

**Knowledge based material design**

LADCA

Our partners/stakeholders

# Strategic research areas examples

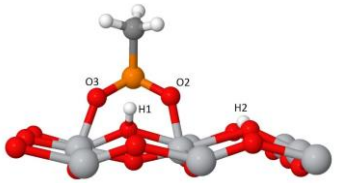


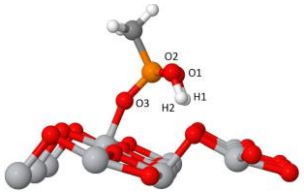

- **Material synthesis and surface modification: Synthesis – properties correlation**

**Separation science**

Hybrid metal oxides: altering surface chemistry for enhanced flux, stability, selectivity, antifouling properties, …

Layere double hydroxides: chemically stable, regenerable metal sorbents




**Sustainable design:**

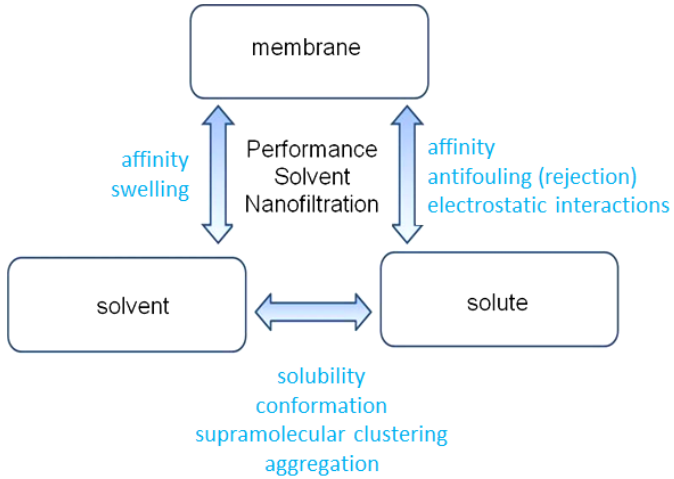
Replacing precious metals by more abundant elements in catalysts

Greener synthesis approaches

- **Properties-performance correlation**

Interaction studies (in-situ IR, sorption, …) => separation, catalysis, …

Material stability studies + stabilization approaches




- **Separation technologies**

Functional ceramic membranes for affinity-driven filtration

Functional ceramic membranes with anti-fouling properties

- **Shaping => materials property tuning**

3D-printed materials

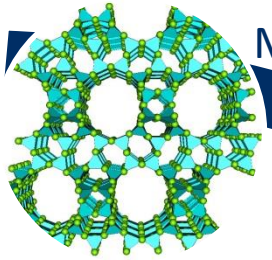
Droplet coagulation



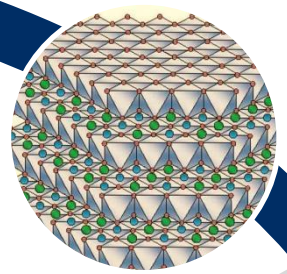
N. Gys et al. ACS Omega (2022) 2022, 7, 49, 45409–45421 https://doi.org/10.1021/acsomega.2c06020
N. Gys et al. ChemPlusChem (2023) https://doi.org/10.1002/cplu.202200441

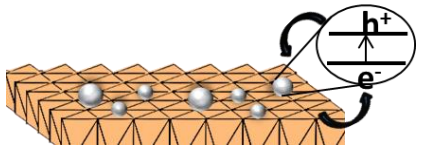
# Areas of Expertise

## Materials



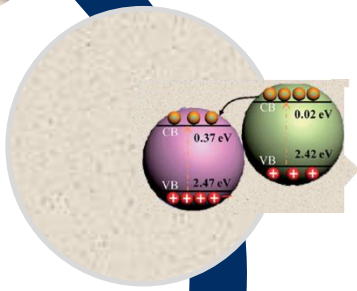
Microporous materials: zeolites



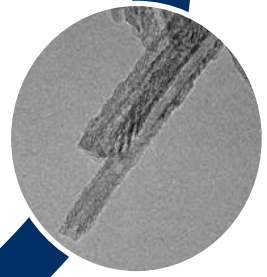



Layered materials: clays, LDHs & Me or MeO/LDHs

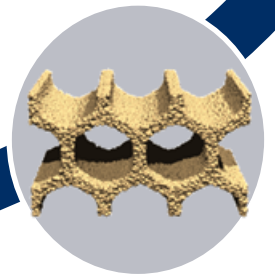
Advanced (nano) materials



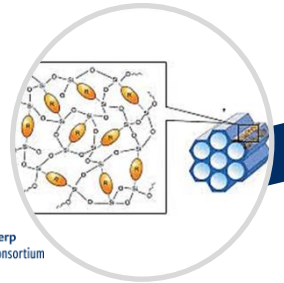

Mixed metal oxides/spinel structures: $ZnO/TiO_2$, $ZnO/SnO_2$, $ZnO/Zn_2TiO_4$, $CeO_2/Zn_2TiO_4$…



$TiO_2$ and titanate nanotubes, black titania



mesoporous materials: silica and metal oxide based



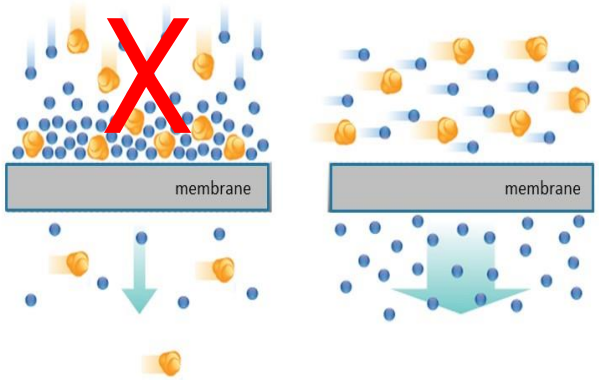
Hybrid organic-inorganic materials: surface modified titania and hybrid silica

# Key achievements

## Tuning performance of hybrid membranes: Exploiting surface interactions and materials properties

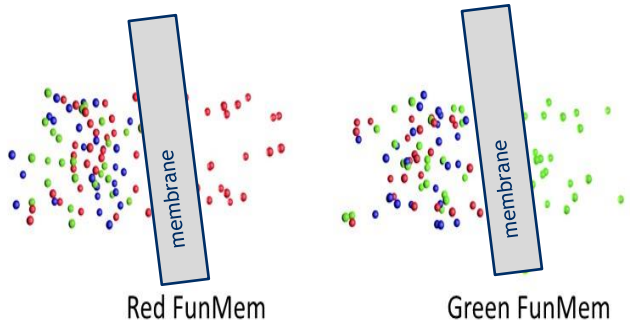
### Improved performance by affinity

**High OSN performance**
Solvent passes, solute retained




**Strong anti-fouling effect**
Higher and stable process flux

**Tunable affinity-based separation**
Solutes separation based on affinity

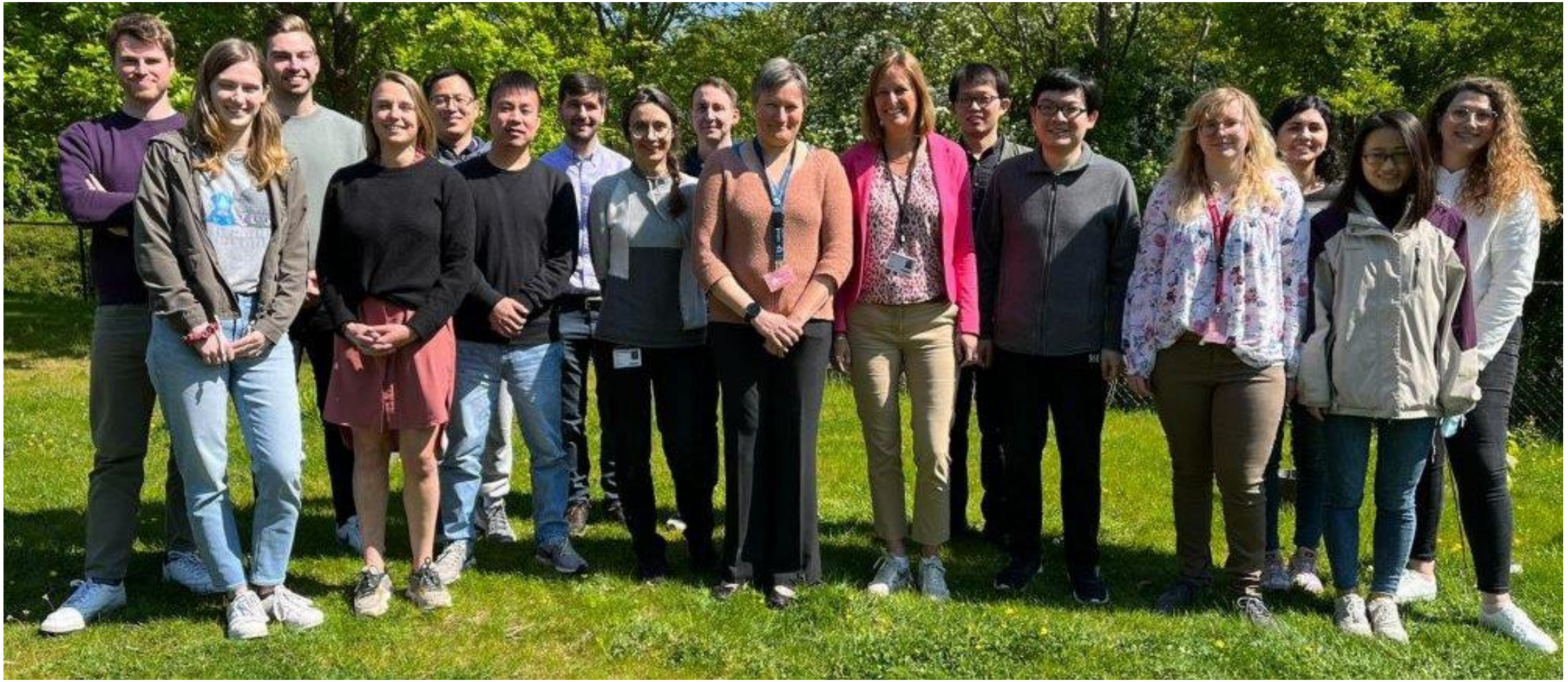



University of Antwerp

vito
vision on technology

a-membranes

# Lets get in touch



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