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Master IEM

Chemical Engineering

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Master project
(examples)

The last thing you do over here
can very well be the first you do in a company!

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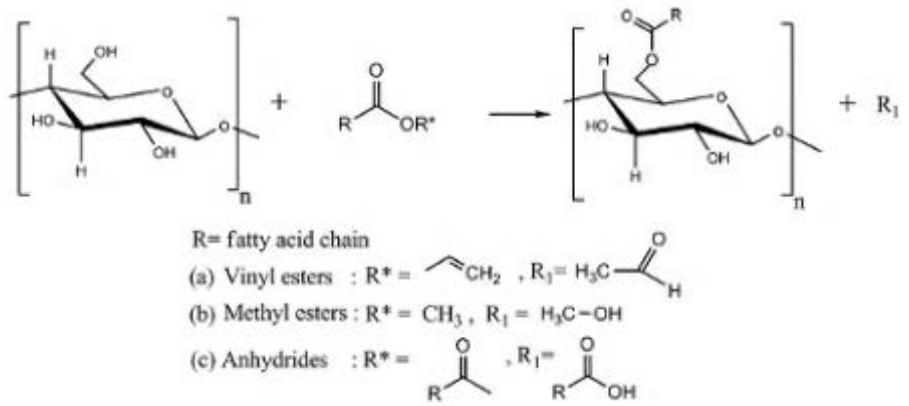
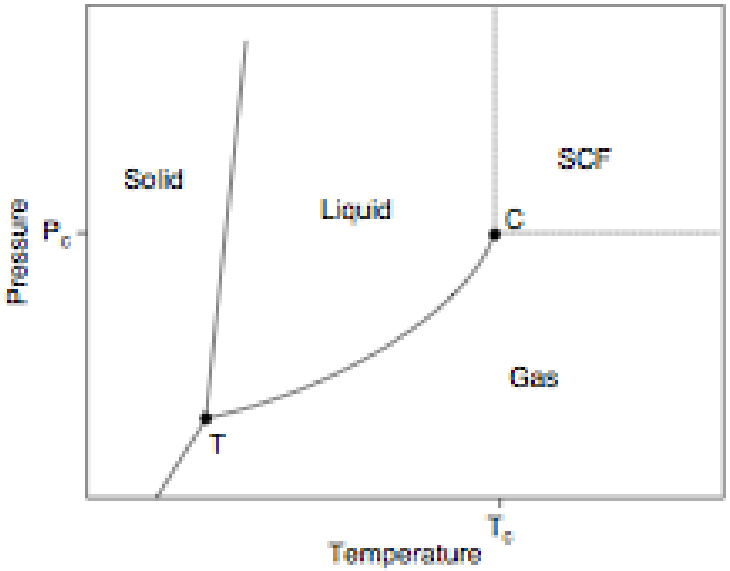
Collaboration with many companies

- Guest lectures (Polymer Products the all course…)
- Master Thesis and of course Internship!

Starch modification



Which solvent? Toluene, DMSO?



Green
Easy to remove
Plenty available

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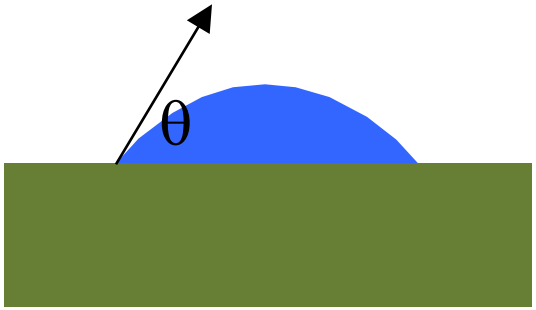
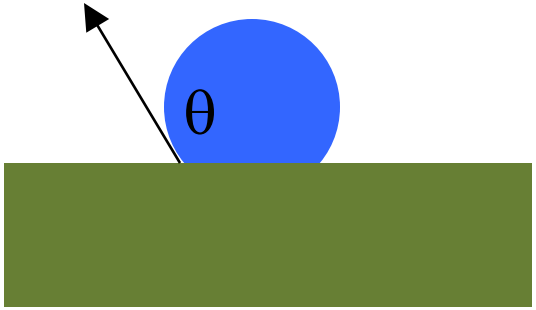
hydrophilic





hydrophobic

No.	Products	DS	Contact angle
1	Starch laurate	0.28	90 ± 1.6
2	Starch laurate	0.26	94 ± 2.1
3	Starch laurate	0.15	104 ± 1.8
4	Starch laurate	0.03	102 ± 1.9
5	Starch laurate	0.02	96 ± 1.4
6	Starch laurate (6 h)[a]	0.05	n.m.[c]
7	Starch stearate	0.06	n.m.[c]
7	Amylose laurate[b]	0.1	n.m.[c]
8	Amylopectin laurate[b]	0.15	n.m.[c]
9	Native potato		45 ± 2.1
10	Vinyl laurate		

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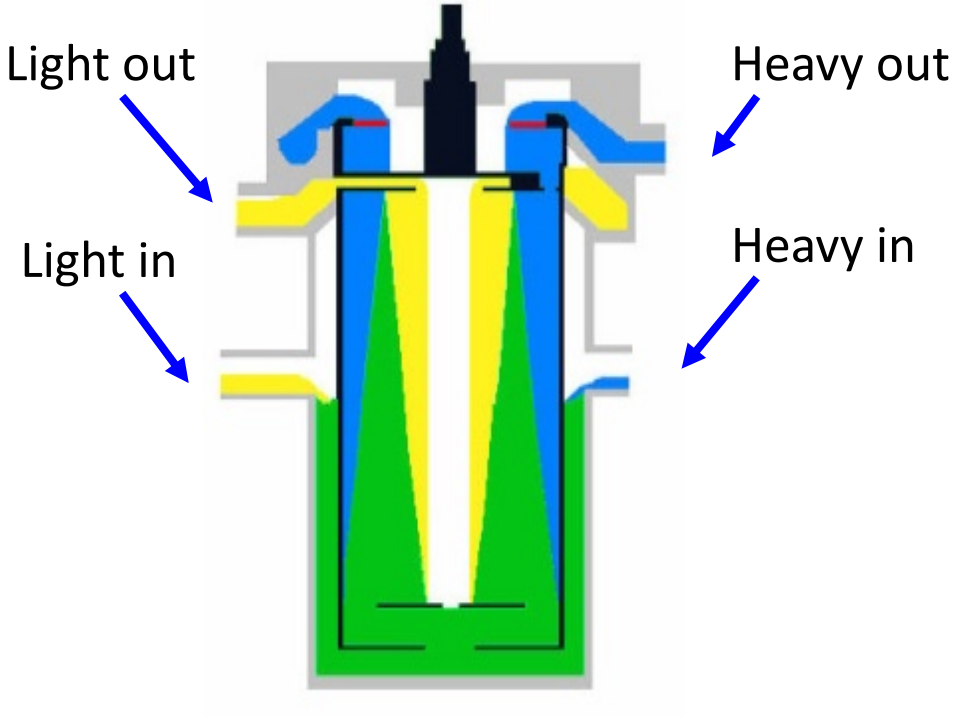
Biodiesel

Biofuels project; novel biodiesel technology



CCS equipment: Centrifugal-contactor separator

G.N. Kraai, F. van Zwol, B. Schuur, H.J. Heeres and J.G. de Vries, *Angew. Chem. Int. Ed*. 47(21) (2008) 3905-3908.

On the importance of Catalysis

Haber-Bosch process:

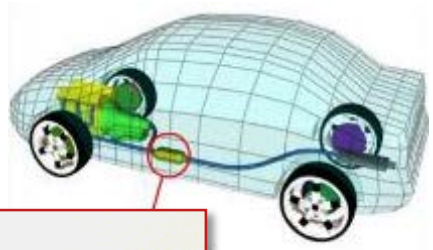
$N_2 + 3\ H_2 \rightleftharpoons 2\ NH_3$

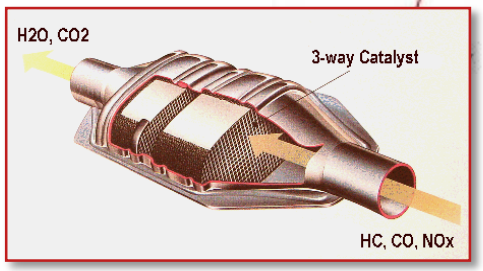
production: 100 million tons/year

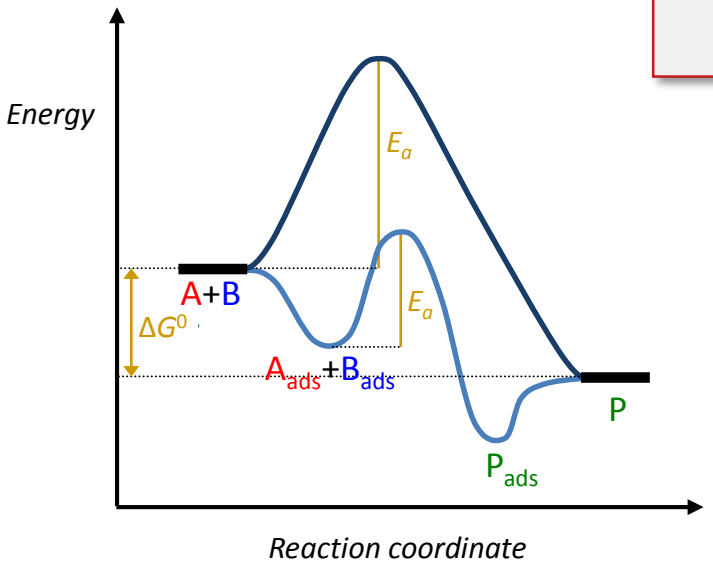
Fe-based catalyst

Three-way catalysts:

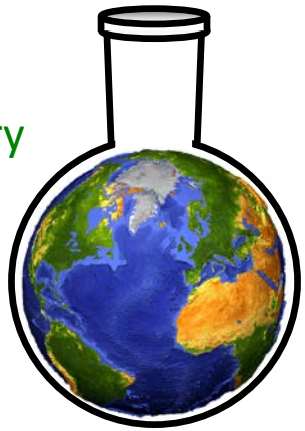
Rh + Pt on γ-Al_2O_3

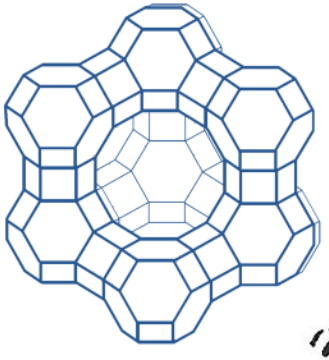






Green Chemistry



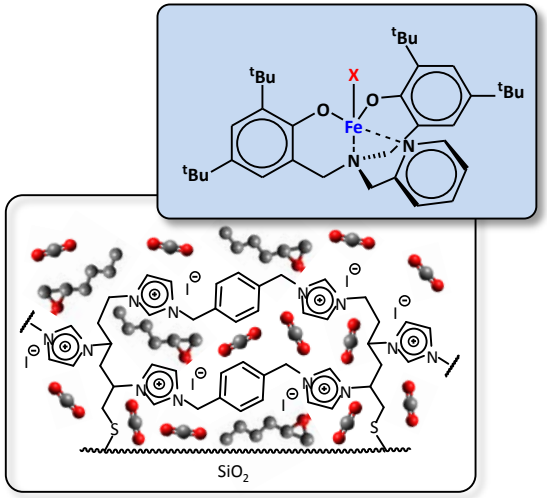


Zeolite catalysts for oil-refining

From CO_2 to valuable products

CO_2 is an inexpensive, non-toxic, widely available and renewable ($\rightarrow$ green) C_1-feedstock.

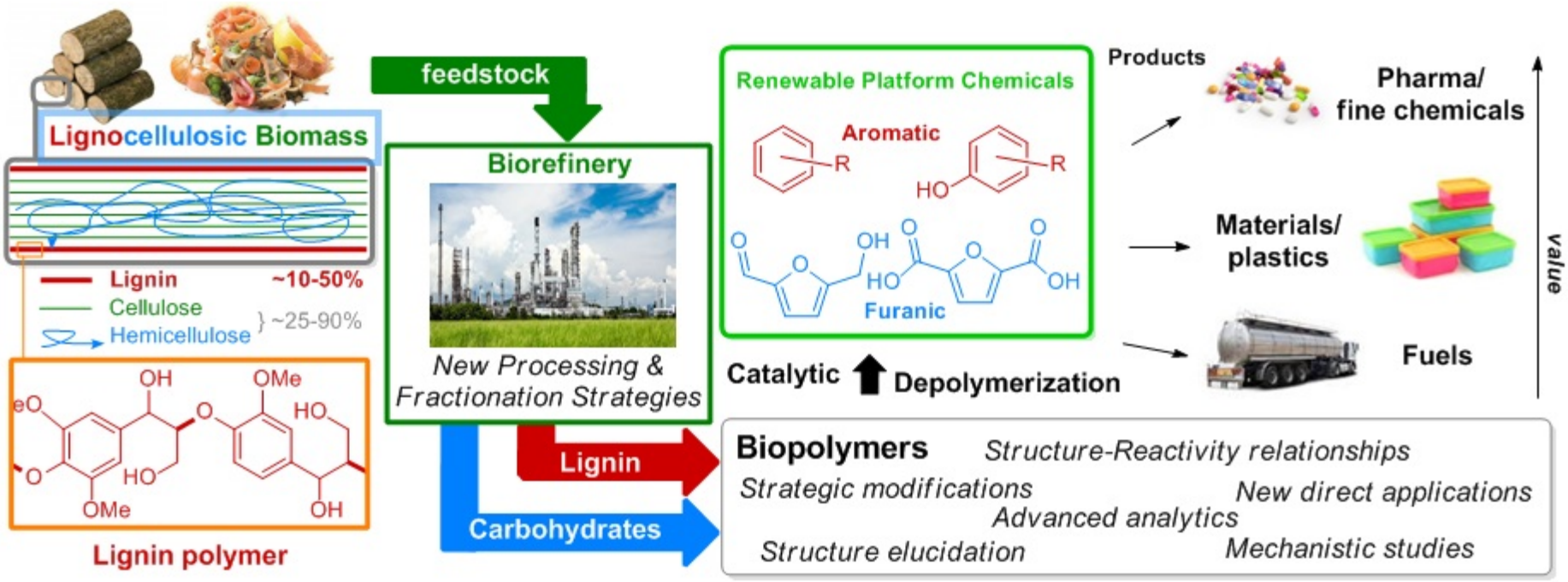
Can we use CO_2 as building block for polymers and other useful products?



Design and development of enhanced catalysts for the conversion of CO_2

More info?
Paolo Pescarmona
(p.p.pescarmona@rug.nl)

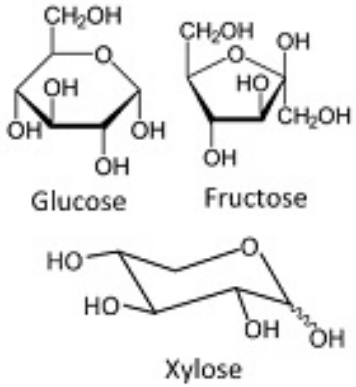
Biomass components to obtain specific chemicals and/or product mixtures



More info?
Peter Deuss
(p.j.deuss@rug.nl)

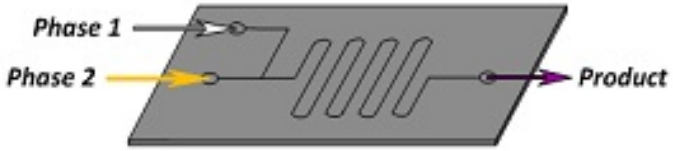
Novel reactor concepts + precision catalysis for highly efficient chemical conversion

Lignocellulosic biomass
(and derivatives)

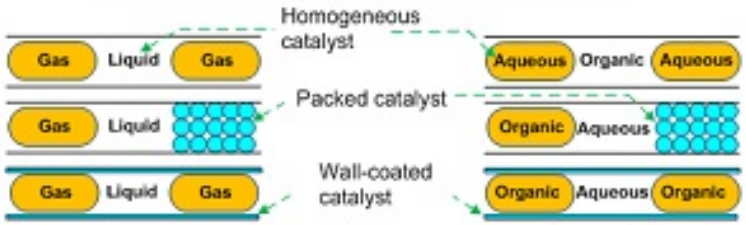


Chemo-catalytic conversion

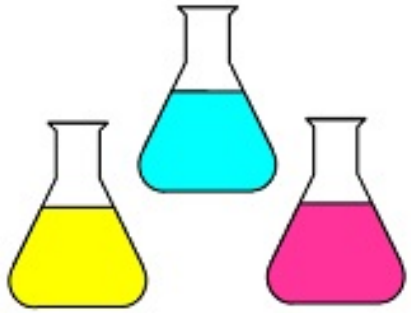
Intensified reactor technologies



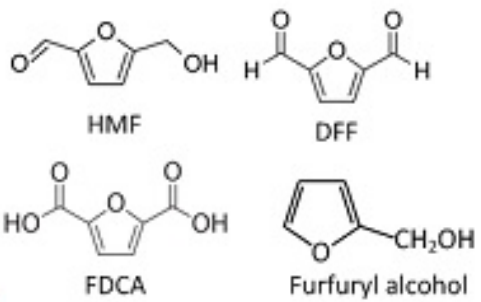
Structured flow (micro)reactor



Advanced process control & improved chemistry

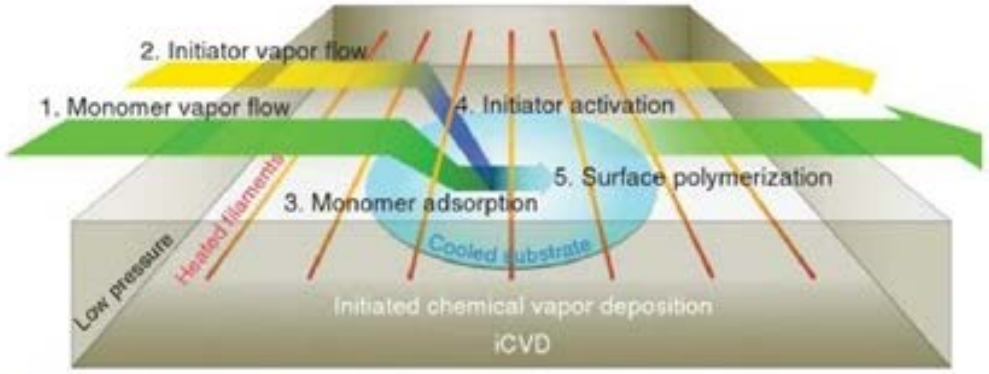


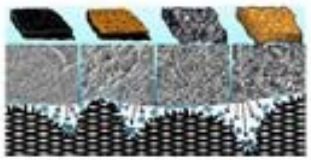
Biobased chemicals
(and materials derived)



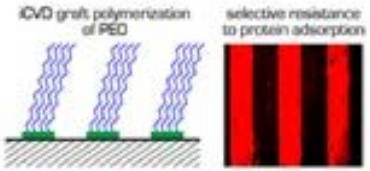
More info?
Jun Yue
(yue.jun@rug.nl)

Vapor deposition polymerization and polymer structure-property relationships

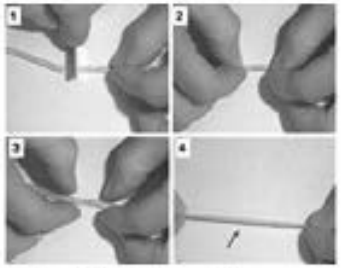




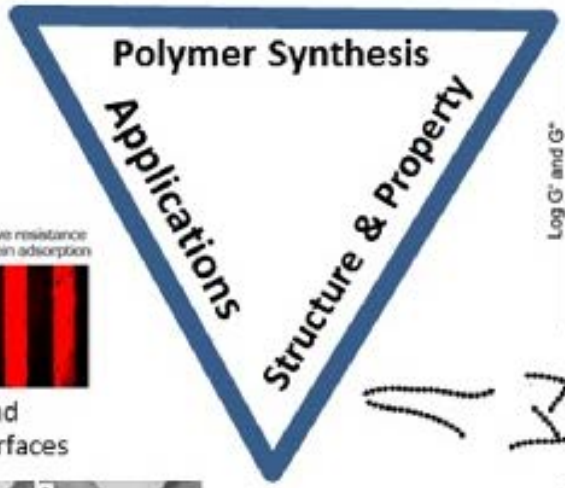
Hierarchical roughness
Switchable hydrophilicity

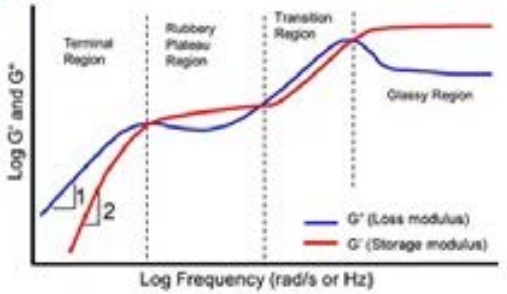


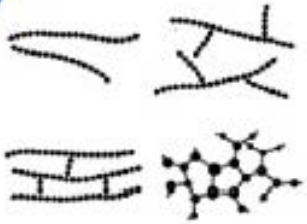
Patternable and
Non-biofouling surfaces



Self-healing polymers







Rheology

More info?
Ranjita Bose
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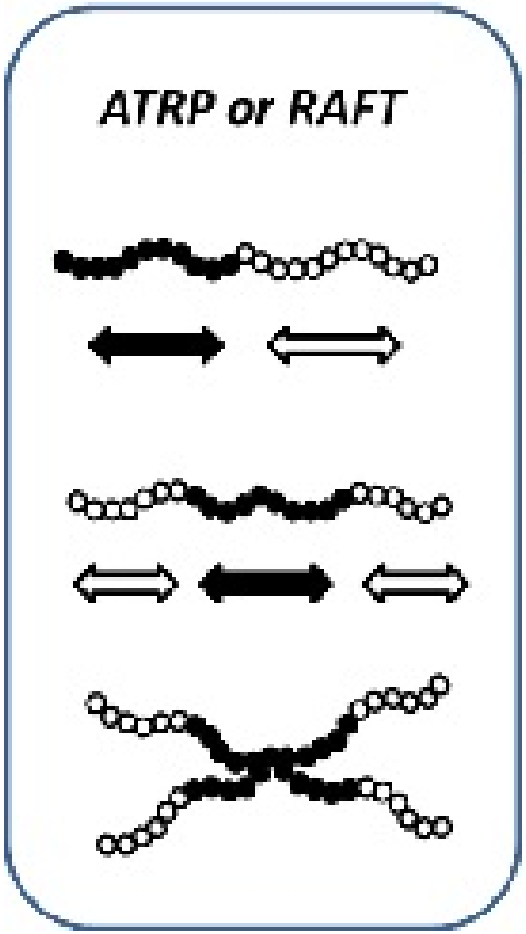
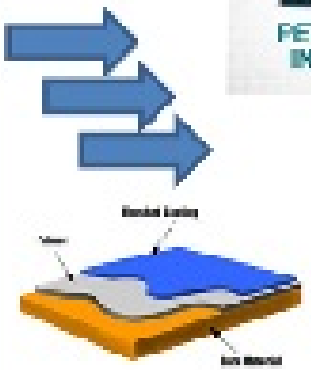
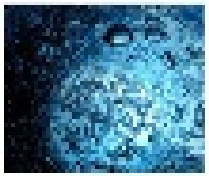
Design of well-defined functional (co)polymers for industrial applications





coatings



hydrogels

detergents

thermo-reversible rubbers

More info?
Patrizio Raffa
(p.raffa@rug.nl)