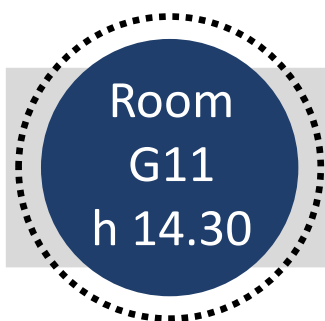




Thursday, 06th June 2024

Franck Dumeignil

Unité de Catalyse et Chimie du Solide
Université de Lille, CNRS, Lille, France



Catalysis of the future: Hybrid Catalysis, Artificial Intelligence, High Throughput experiments... and their combinations

Catalysis is experiencing a second gold age boosted by bioeconomy as an opportunity to develop new solutions benefiting from up-to-date concepts and technologies almost from scratch, the derived industrial units being in most of the cases to be designed, built and operated. To this respect, (i) the hybrid catalysis concept is emerging, which takes benefit from both chemo- and biocatalysis in one pot, (ii) high throughput experiments, optionally combined with Design of Experiments, enable fast synthesis, testing and characterization of catalysts, and (iii) AI is a real opportunity to, e.g., pave the way towards the Holy Grail of predictive catalysis. University of Lille is committed in a multidisciplinary effort to develop such a catalysis of the future, even combining these three pillars in order to further explore unprecedented synergies.

As an example of realization, we proposed two new conceptual pathways involving hybrid catalysis to overcome limitations resulting from the enzymatic glucose isomerase thermodynamic equilibrium between glucose and fructose, as a key step for subsequent HMF synthesis:

- Simultaneous implementation of glucose isomerase and of fructose to HMF dehydration chemocatalyst in a multiphasic way involving fructose complexation and transport (**Figure 1**);
- A route through sorbitol avoiding enzymatic isomerization, in which sorbitol - readily obtained by glucose hydrogenation - is further enzymatically converted to fructose with an *in situ* cofactor regeneration using an organometallic complex (**Figure 2**).

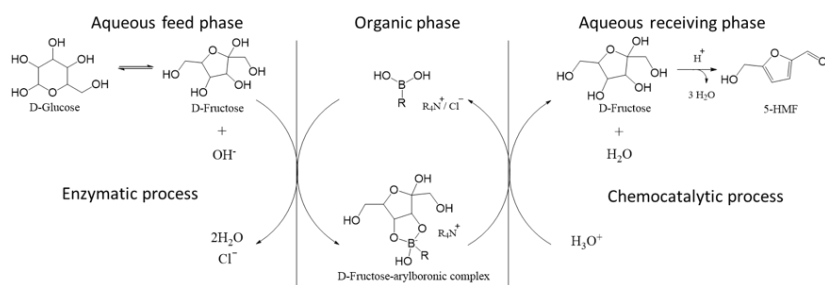


Figure 1. Complexation/transport strategy

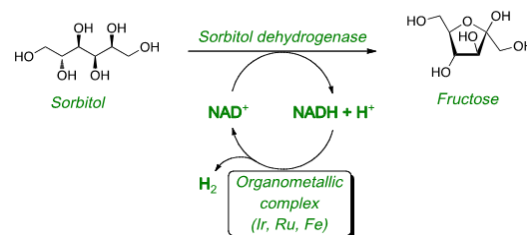


Figure 2. Hybrid isomerization



The event will be streamed on zoom.us
for external participants!

For registrations: seminari.dipchi@unimi.it



UNIVERSITÀ
DEGLI STUDI
DI MILANO