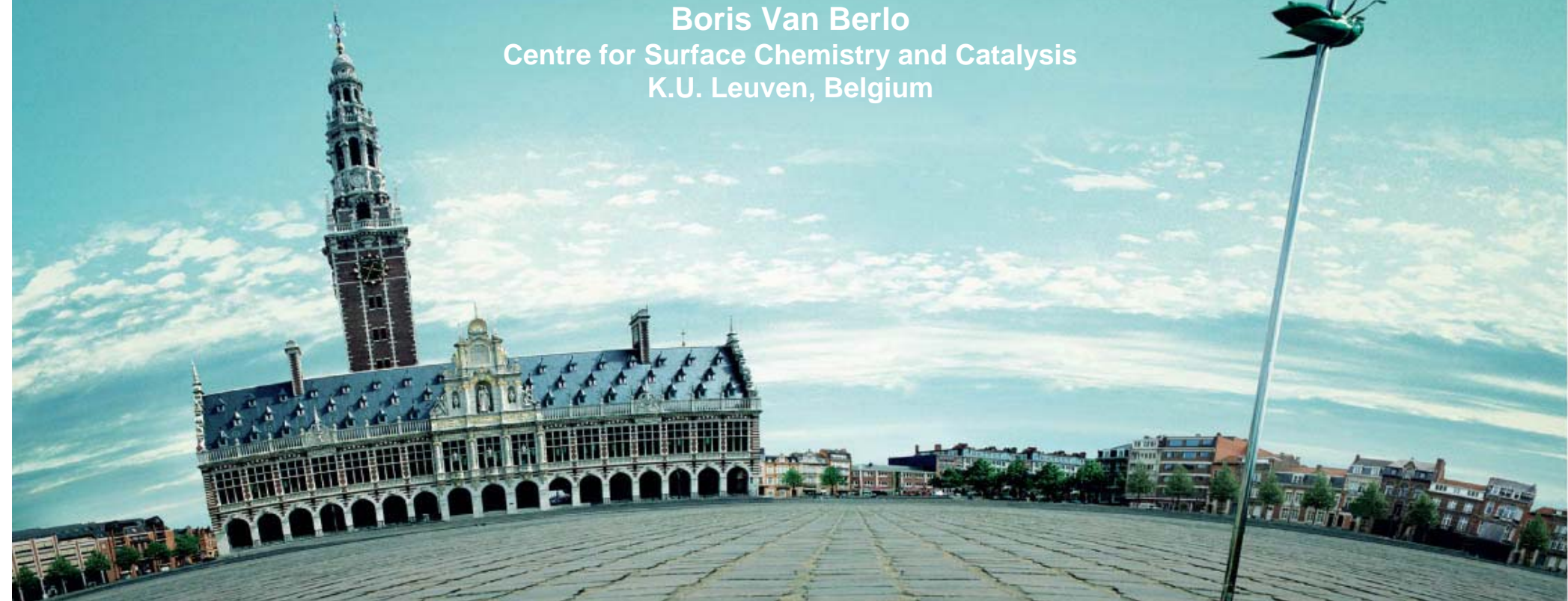




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# Support Dependent Shape Selectivity for Specifically Immobilized Hoveyda-Grubbs Catalysts

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# I. Catalyst Preparation

## Immobilization of Ru-complexes

Reported strategies: Various multiple step syntheses

Modifications of complex and/or support

*C. Copéret, J.M. Basset, Adv. Synth. Catal. 349 (2007) 78*

### Our approach:

Commercial available silica



Ru-complex dissolved in toluene



Immobilized catalyst after only 3h

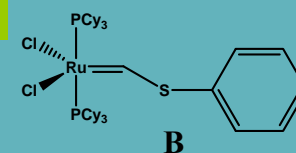
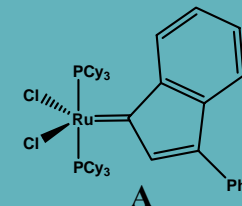
### Advantages:

Simple and fast immobilization

No modifications or pre-treatments

Excellent shelf-life


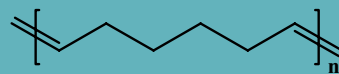
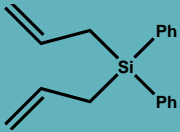
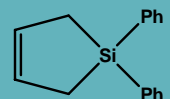
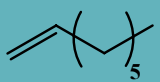
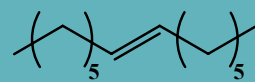
Ru-complex	Adsorption	Leaching	Catalytic Activity	Stability
Grubbs 1	Yes	High	Yes	Low
Grubbs 2	Yes	Medium	Yes	Medium
Hoveyda 1	Yes	Medium	Yes	Medium
Hoveyda 2	Yes	Low	Yes	High
A	Yes	Low	No	High
B	Yes	High	Yes	Medium





## II. Catalyst Performance

### Batch Reactions

Substrate	Solvent	Product #	Time [h] (temp [°C])	Conversion (%) *
	hexane		2 (25)	98
	hexane		10 (25) 10 (45)	15 44
	hexane		4 (25)	95

(1) 1 mol% (2) 3 mol% (3) 0,2 mol%

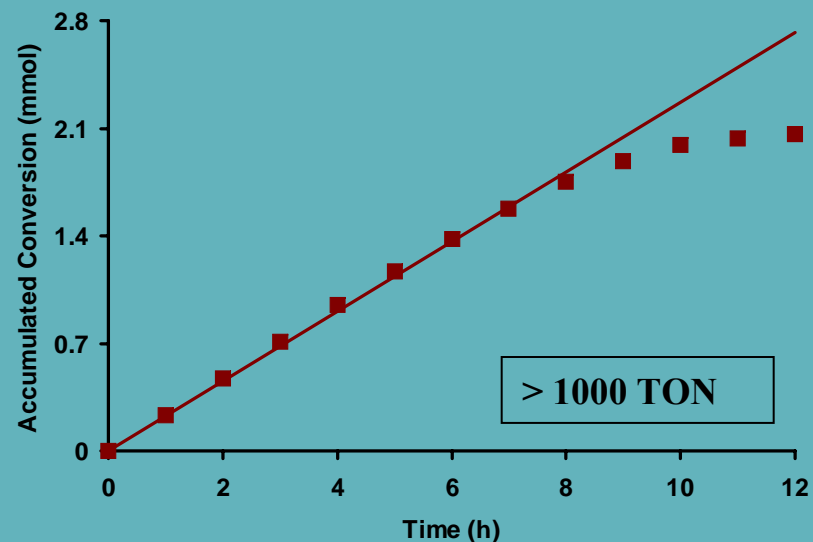
? Is the catalytic system heterogeneous ?  
→ Split-tests say: **Yes!**

**Ru Leaching << 140 ppb**

### Batch Recycling

Cycle	1	2	3	4
Conversion (% after 2h)	98	98	97	98

### Continuous Flow Reaction



0,2g of 0,75 wt% catalyst, 5,5 mmol cyclooctene, hexane, r.t., 10ml/h



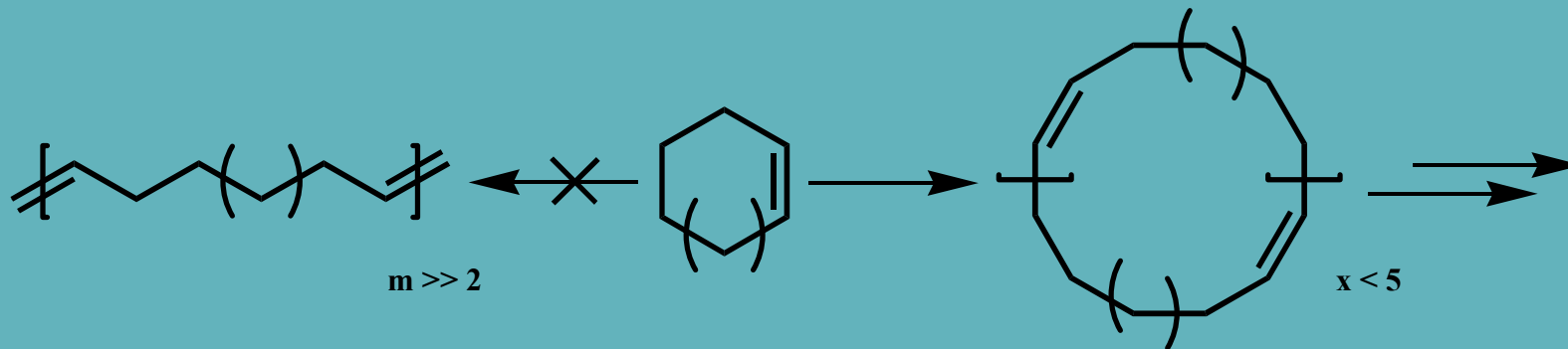
### III. Shape Selectivity

Support-material with structured pores



change in product distribution

> 97% cyclic oligomers



Homogeneous & Heterogeneous  
Linear Polymerization

Hoveyda 2 on MCM-41  
Cyclic Oligomers (< 50 C-atoms)

*Opens interesting perspectives*

- more traditional: play with substrate concentration & flow rate in continuous system
- catalyst: supports with structured pores + tuning pore-size