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New Approach for Highly Active Hydrogenation Catalysts

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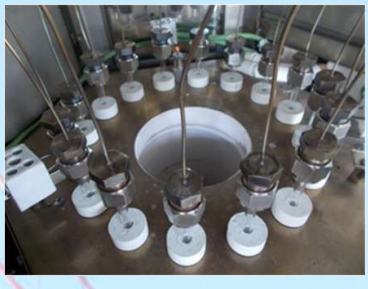
Alvacat

Company Profile

- Contract research
- Heterogeneous catalysis, Materials science
- Renewables
- Environmental catalysis
- Hydrogen storage catalysis
- Energy storage, Battery materials
- Custom catalyst and support development
- Lab scale, bench scale and scale up
- Catalyst carrier and solution inventory
- High throughput synthesis and screening
- Partnered with tollers for scaleup, piloting, manufacturing and metal recycling

High Throughput Screening of Hydro-/Dehydrogenation Catalysts

16-channel bench scale fixed bed screening reactor



Top view of reaction zone

Nanoparticulated Ni Catalysts

Combustion Synthesis Pechini Method

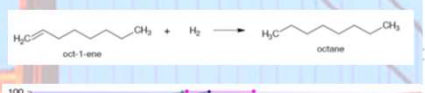
Lab scale	
NiO	400 m^2/g
$NiO-CeO_2$	320 m^2/g
$NiO-Nb_2O_5$	270 m^2/g

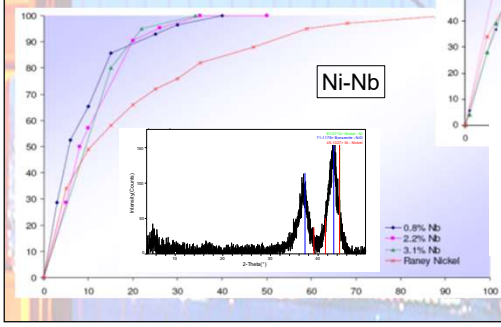
Scale up	
Nickelox NiO	250 m^2/g
Total carbon	1%
Particle size	13 um
Phase	crystalline

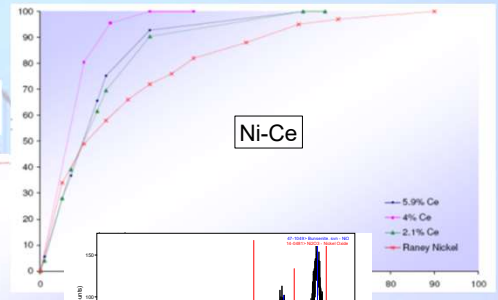
Wöhler Symposium, TU Munich, October 9-10, 2008

Screening Results I – Hydrogenation of Octene

Pechini-Ni outperforms Raney-Ni





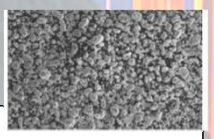


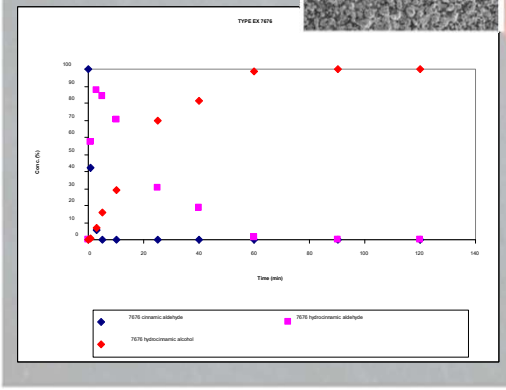
Time (min)

Catal. Today 137, 2008, 132-143

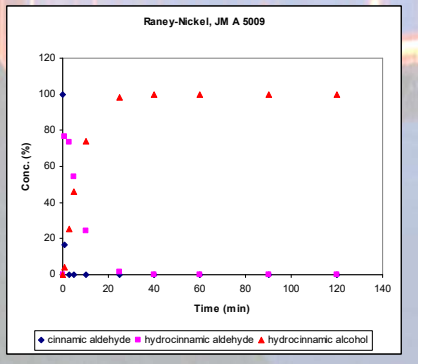
Screening Results II – Hydrogenation of Cinnamic Aldehyde

Nickelox-250





Raney-Nickel, JM A 5009 (Johnson Matthey)



EuroCombiCat 2007, Bari, April 22-25, 2007

Conclusions

Novel High Activity Ni Hydro-/Dehydrogenation Catalysts

- **High-throughput experimentation to accelerate catalyst development and shorten time to market**
- **HSA NiO nanopowders have been prepared by combustion synthesis and evaluated for hydrogenation model reactions**
- **Alvacat has profound experience with PGM and base metal (de)-hydrogenation catalysts**
- **Recipes for catalyst powder shaping into extrudates available**
- **Potential application: Low temperature dehydrogenation of LOHC (Liquid Organic Hydrogen Carriers) requires development of novel and highly active catalysts**