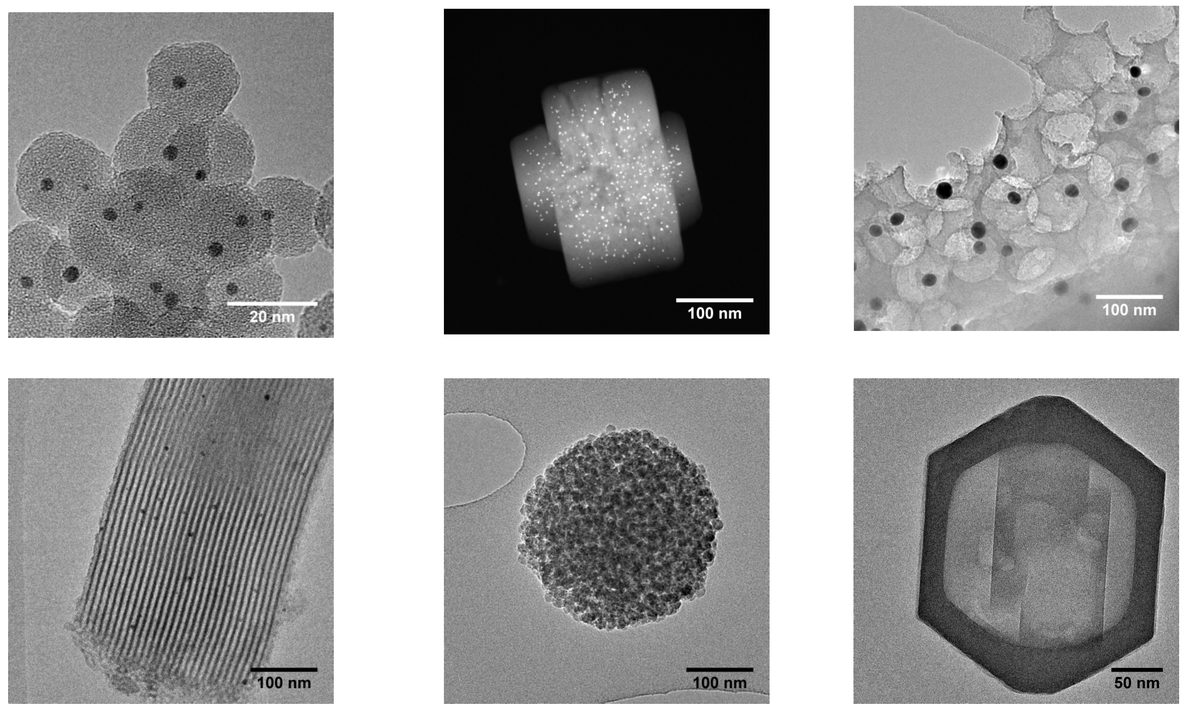
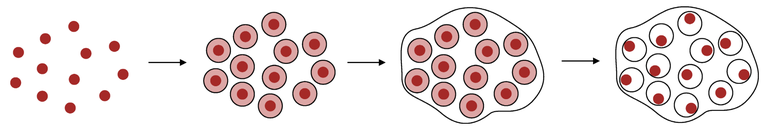
Synthesis of nanomaterials

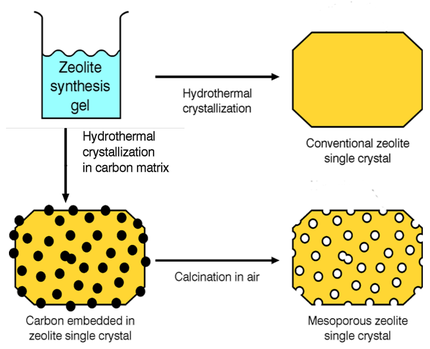


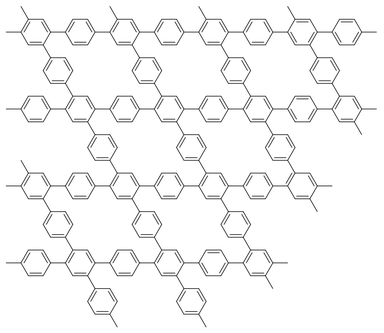
Industrial application

Molecular understanding

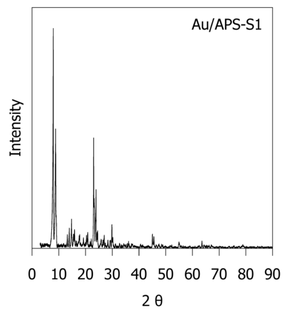
Design

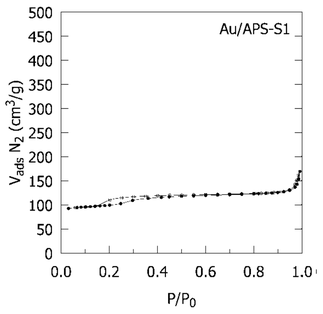


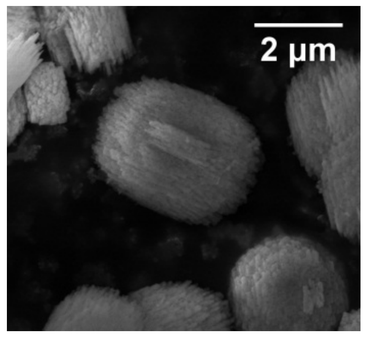


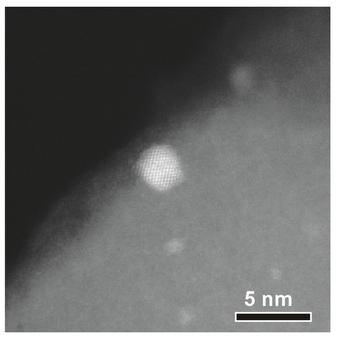


Characterization





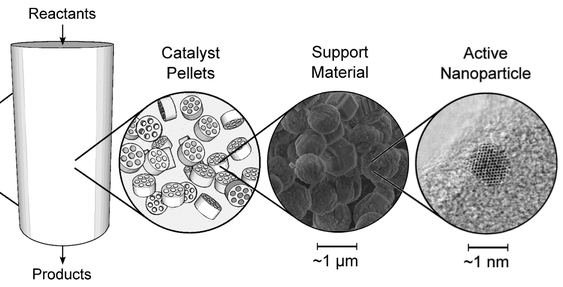


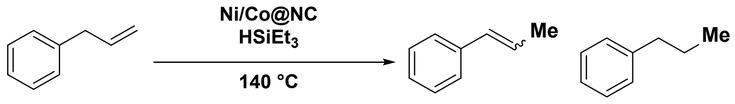


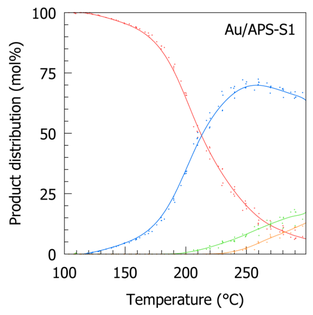
Publication

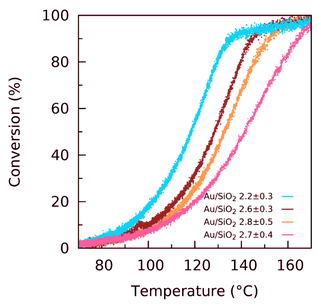
Top student

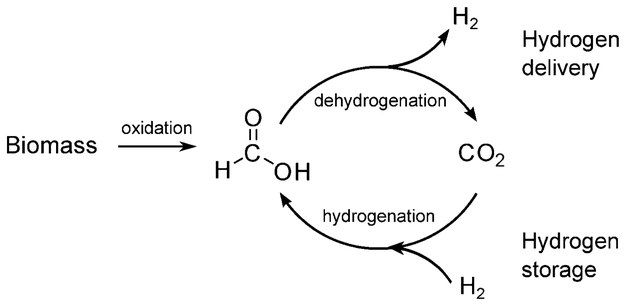
Catalysis











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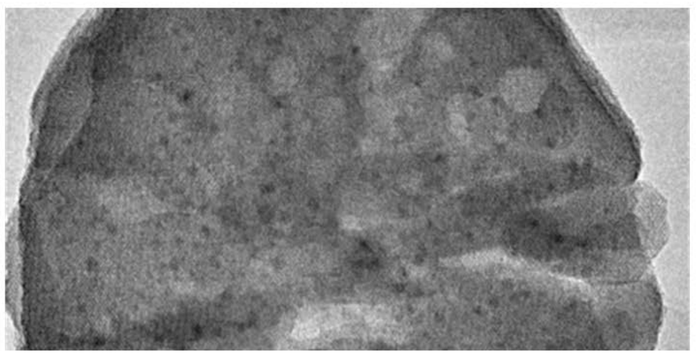

PROJEKT

ENCAPSULATION OF METAL NANOPARTICLES

DEL FAVORIT

Udbyder
VEJLEDER

Sted
KØBENHAVN OG OMEGN

The aim of the project is to develop novel heterogeneous catalysts by encapsulation of metal nanoparticles in zeolites.

The encapsulation of metal nanoparticles in zeolites has recently attracted much attention because the zeolite framework may introduce selectivity in terms of size- and shape selectivity or prevent the encapsulated nanoparticles from sintering by Ostwald ripening or particle migration and coalescence. It has previously been argued that the encapsulation of metal nanoparticles in small and medium-pore zeolites may preclude post-synthetic methods, such as ion-exchange or impregnation, which require the migration of solvated metal-oxo oligomers that cannot diffuse through the small apertures in these materials. Much effort has therefore been devoted to develop bottom up approaches, where the metal nanoparticles are formed prior to zeolite crystallization or recrystallization. Although the encapsulation of preformed nanoparticles is an effective and elegant concept, they often rely on complex synthetic procedures and expensive additives, which may prevent large-scale production and general implementation. This project aims to develop more effective and scalable methods to encapsulate metal nanoparticles in zeolites.

SØG I OPSLAG

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ECTS-point
5 - 35

Type
Afgangsprojekt, Andet, Bachelorprojekt, Kandidatspeciale, Specialkursus

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PROJEKT

POROUS POLYMER AND CARBON SUPPORTS

DEL FAVORIT

Udbyder
VEJLEDER

Sted
KØBENHAVN OG OMEGN

The aim of the project is to develop novel catalysts and support materials for heterogeneous catalysis.

Classic heterogeneous catalysts consist of metal nanoparticles on a metal oxides support. However, new types of materials may have special ability and properties. In the project porous polymer and carbon supports will be synthesised for use in heterogeneous catalysis. The produced will be tested in conversion of formic acid (HCOOH). Formic acid has recently attracted considerable attention because of its great potential as a hydrogen storage material and as a means to utilize CO_2. Since formic acid can be synthesized by CO_2 hydrogenation, a carbon-neutral storage-and-release cycle can easily be envisioned, although this situation requires that a large amount of renewable hydrogen is readily available. Alternatively, formic acid may be produced from biomass, for instance by the catalytic oxidation of cellulose. The starting point of the catalytic tests will be the selective dehydrogenation of formic acid into H2 and CO_2.

More information www.kemi.dtu.dk/kegnaes

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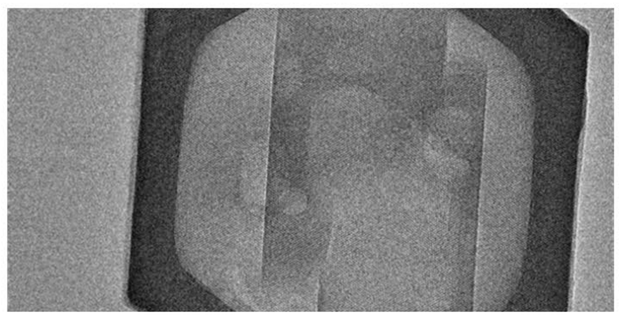

PROJEKT

NOVEL NANOSTRUCTURED MATERIALS

DEL FAVORIT

Udbyder
VEJLEDER

Sted
KØBENHAVN OG OMEGN

The aim of the project is to develop new nanostructured materials for applications in heterogeneous catalysis

The encapsulation of metal nanoparticles and inorganic complexes in porous nanostructured materials has recently attracted much attention because of the ability to obtain a unique catalytic selectivity.

In the project novel nanostructured materials for applications in heterogeneous catalysis will be developed. Below is shown an examples of a nanostructured materials: hollow zeolite "nanoreactor". The inside of the reactor is only accessible through small micropores. This allow only selected molecules to enter the reactor and get converted. Synthesized catalysts will be evaluated through various characterization techniques

More information www.kemi.dtu.dk/kegnaes

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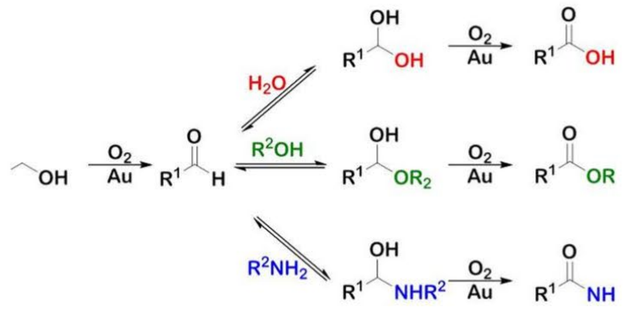

PROJEKT

SELECTIVE AEROBIC OXIDATIONS WITH GOLD CATALYSIS

DEL FAVORIT

Udbyder
VEJLEDER

Sted
KØBENHAVN OG OMEGN

The aim of the project is to develop novel gold-nanoparticle-catalysts for production of renewable chemicals.

Until recently metallic gold was considered essentially unreactive. However, during the last decade it has been shown that gold nano-sized particles are surprisingly active and selective catalysts for several oxidation reactions with molecular oxygen in particular. Oxygen is considered a "green" oxidant because it produces water as the only by-product. From an economic point of view, aerobic oxidation is also very attractive due to the low cost of air and its unlimited accessibility. In organic chemistry, the oxidation of alcohols is one of the most important reactions. However, many of these oxidations are usually carried out using stoichiometric amounts of high-valent metal oxides, e.g. manganese or chromium oxides, which produce a huge amount of waste in term of metal atoms. To provide a practical and environmentally friendly alternative to these classical oxidations we have invested considerable effort in the development of aerobic oxidations.

Projects at all levels are offered within Renewable Chemicals regarding gold-catalyzed conversion of renewable alcohols into carboxylic acids and derivatives as exemplified above. Depending on project direction and aim, projects will take place in cooperation with Danish companies

More information www.kemi.dtu.dk/kegnaes

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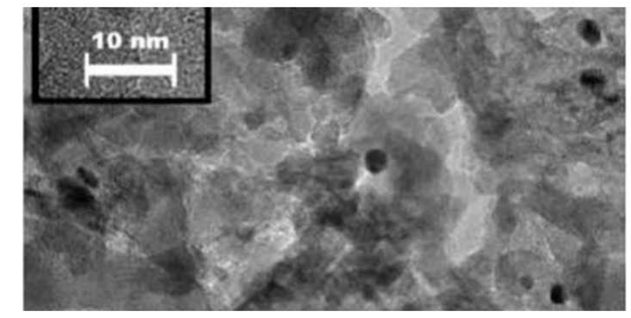

PROJEKT

SYNTESE AF METALNANOPARTIKLER TIL BÆREDYGTIG KEMIKALIEFREMSTILLING

DEL FAVORIT

Udbyder
VEJLEDER

Sted
KØBENHAVN OG OMEGN

Formålet med projektet er at syntetisere metalnanopartilker samt skabe nye bæredygtige og grønne metoder til fremstilling af lægemidler og kemikalier baseret på katalytiske metalnanopartikler og luft.

Den kemiske industri er verdens største industri og den har stor indflydelse på vores liv, da den fremstiler mange af de ting vi bruger i vores dagligdag f.eks. benzin, plastik og medicin. I lyset af de nuværende miljøudfordringer såsom energimangel og stigende CO_2 udledning er der et nødvendigt behov for at udvikle en mere bæredygtig kemisk industri. Det vil sige en industri, der bygger på mindre miljøbelastende kemiske processer ("grønne" reaktioner), som i højere grad bruger fornybare ressourcer som udgangsstoffer og som ikke producerer farligt affald. Ilt fra luften er det "grønneste" oxidationsmidler der findes. Udover at være verdens billigste oxidationsmiddel danner det også kun vand som "affaldsprodukt" ved brug. Formålet med projektet er at syntetisere metalnanopartilker samt skabe nye bæredygtige og grønne metoder til fremstilling af lægemidler og kemikalier baseret på katalytiske metalnanopartikler og luft. Du/I vil komme til at deltage aktivt i vores egen forskning indenfor området.

Mere information www.kemi.dtu.dk/kegnaes

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