FAU

crt Lehrstuhl für Chemische Reaktionstechnik

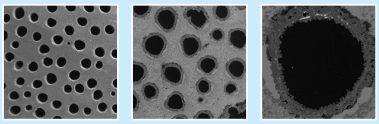
E A M ENGINEERING OF ADVANCED MATERIALS

Novel catalytic materials

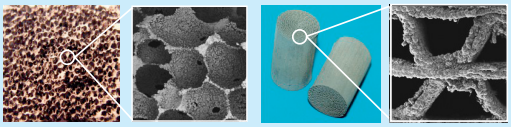
Hierarchical materials

Catalysts with defined hierarchical pore structure are advantageous.

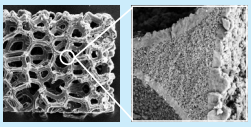
- substrate transport in macropores (low Δp)
- reaction in meso- and micropores (high surface area)



Combination of macroporous foams, honeycombs, ceramics with microporous zeolites, hydrotalcites, alumosilicates, or layered materials



Synthesis



Surface functionalization

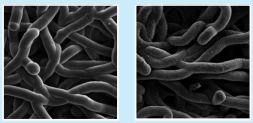
- crystallization (in-situ, hydrothermal, microwave)
- coating (new coating techniques, e.g. dip-coating)

Characterization

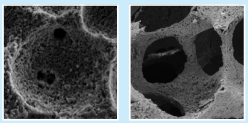
- TG/DSC/DTA/TG-MS
- N_2 sorption, H_2O sorption, Hg intrusion
- TPD/TPR, XRD

Applications

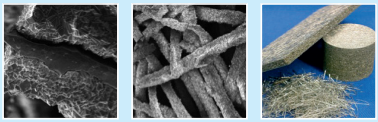
Ceramic fibers



Metal foams

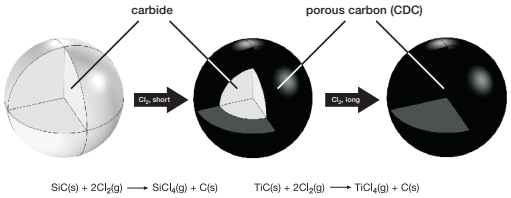


Metal fibers



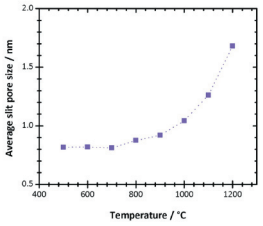
Carbide-derived carbon

Novel structured nanoporous carbons with tailored, reproducible properties for application in catalysis are processed via the carbide-derived carbon (CDC) method.



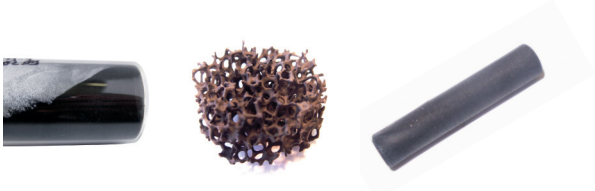
Material properties

- variable pore size
- variable graphitization
- high purity



From nano to macro to structured…

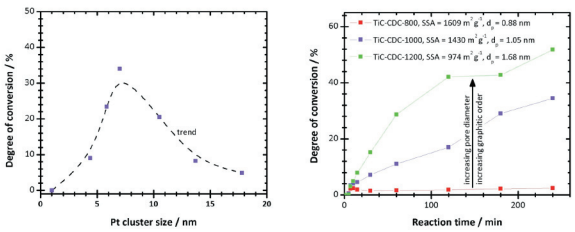
Besides macro and nanopowders, CDC materials can be synthesized as films, foams and monoliths.



Applications

- catalyst support (e.g. for Pt)
- stable in hydrothermal, alkaline or acidic environment
- tunable for optimal catalytic performance

Example: Thymol hydrogenation



5 mg thymol, 150 ml cyclohexane, 2.5 wt.-% Pt, 150 °C, 5 MPa H_2, 600 min^{-1}

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