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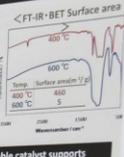
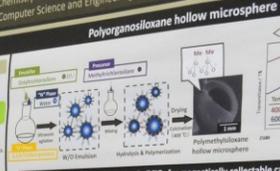
Fabrication of acid-tolerant magnetic Co@SiO₂ core-shell particles with dense silica shell

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Magnetically collectable catalyst

Highly collectable catalysts
Magnetically collectable catalysts
Chemically stable catalysts
Catalytic activity



This study: Application to prepare Co@SiO₂ for magnetically collectable catalyst supports

Preparation of Co@SiO₂



Acid-treatment of Co@SiO₂

Co@SiO₂ with dense silica shell by heat-treatment at 700 °C



Surface area of Co@SiO₂ decreased to be quite small after heat treatment at 700 °C. Magnetism was kept during recovering in 1M-HCl.
Silica in Co@SiO₂ became dense to avoid penetrating acidic solution.

STEM observations of Co@SiO₂ treated by 1M-HCl



Average particle size of Co@SiO₂ treated by 1M-HCl: 0.3 μm
Co particles are in the cavity of silica hollow sphere even after 1M-HCl treating.

Leaching of Co from Co@SiO₂ and its magnetic property



Applicable of the acid-tolerant Co@SiO₂ to magnetically collectable catalyst supports in aqueous media.

Immobilization of sulfonic groups on Co@SiO₂

1) Sulfonic Group Immobilization
2) Catalytic Performance

Conclusions

Some type acid-tolerant Co@SiO₂ particles with dense shell were synthesized by using polydimethylsiloxane as precursor of the silica shell.
A series of Co@SiO₂ of various kinds can be fabricated by using polydimethylsiloxane as the precursor of acid-tolerant.
The Co@SiO₂ particles with dense silica shell are applicable as magnetically collectable catalyst supports in acidic media.









MCM-48 Nanofibers: A Pseudomorphic Synthesis of an Isotropic Mesostructure and Anisotropic Morphology
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Introduction: The synthesis system of the MCM-48 nanofiber exhibited resulted in MCM-48 nanofibers with isotropic mesostructure and anisotropic morphology. The nanofibers were synthesized by the sol-gel process of tetraethyl orthosilicate (TEOS) and poly(2-vinylpyridine) (P2VP) in the presence of a surfactant, MCM-48. The resulting nanofibers were characterized by transmission electron microscopy (TEM) and X-ray diffraction (XRD). The nanofibers exhibited a well-ordered mesostructure with a pore size of 40-50 nm. Both the isotropic and anisotropic nanofibers were synthesized by the same synthesis system. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition.

Experimental: The synthesis system of the MCM-48 nanofiber exhibited resulted in MCM-48 nanofibers with isotropic mesostructure and anisotropic morphology. The nanofibers were synthesized by the sol-gel process of tetraethyl orthosilicate (TEOS) and poly(2-vinylpyridine) (P2VP) in the presence of a surfactant, MCM-48. The resulting nanofibers were characterized by transmission electron microscopy (TEM) and X-ray diffraction (XRD). The nanofibers exhibited a well-ordered mesostructure with a pore size of 40-50 nm. Both the isotropic and anisotropic nanofibers were synthesized by the same synthesis system. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition.

Conclusion: The synthesis system of the MCM-48 nanofiber exhibited resulted in MCM-48 nanofibers with isotropic mesostructure and anisotropic morphology. The nanofibers were synthesized by the sol-gel process of tetraethyl orthosilicate (TEOS) and poly(2-vinylpyridine) (P2VP) in the presence of a surfactant, MCM-48. The resulting nanofibers were characterized by transmission electron microscopy (TEM) and X-ray diffraction (XRD). The nanofibers exhibited a well-ordered mesostructure with a pore size of 40-50 nm. Both the isotropic and anisotropic nanofibers were synthesized by the same synthesis system. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition.

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Supporting Information: The synthesis system of the MCM-48 nanofiber exhibited resulted in MCM-48 nanofibers with isotropic mesostructure and anisotropic morphology. The nanofibers were synthesized by the sol-gel process of tetraethyl orthosilicate (TEOS) and poly(2-vinylpyridine) (P2VP) in the presence of a surfactant, MCM-48. The resulting nanofibers were characterized by transmission electron microscopy (TEM) and X-ray diffraction (XRD). The nanofibers exhibited a well-ordered mesostructure with a pore size of 40-50 nm. Both the isotropic and anisotropic nanofibers were synthesized by the same synthesis system. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition. The anisotropic nanofibers were synthesized by the same synthesis system as the isotropic nanofibers, but with a different synthesis condition.

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