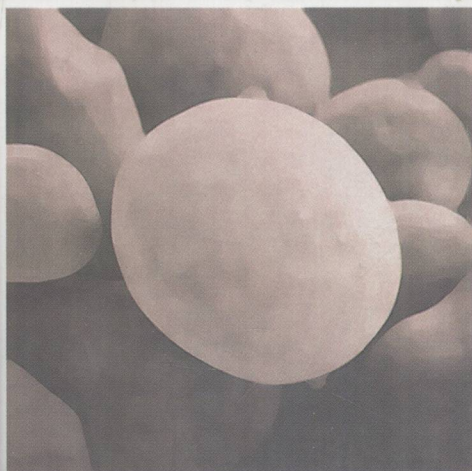
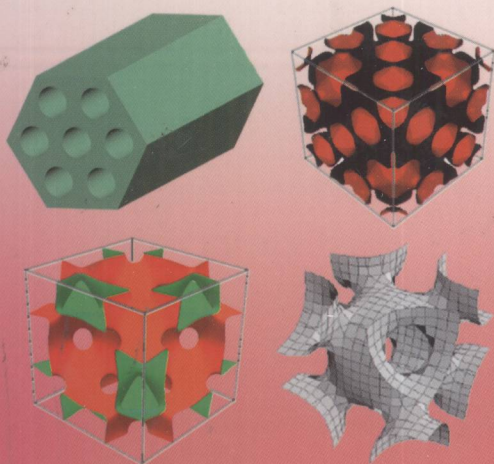
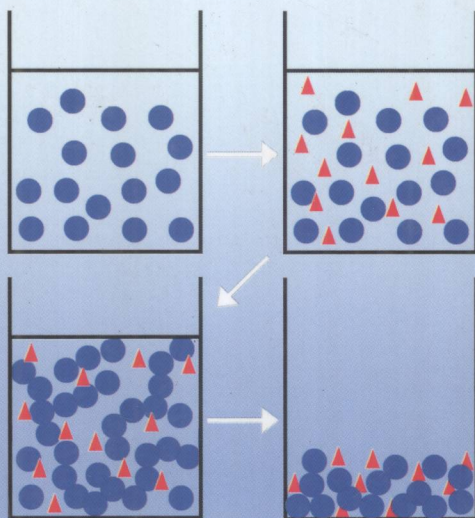
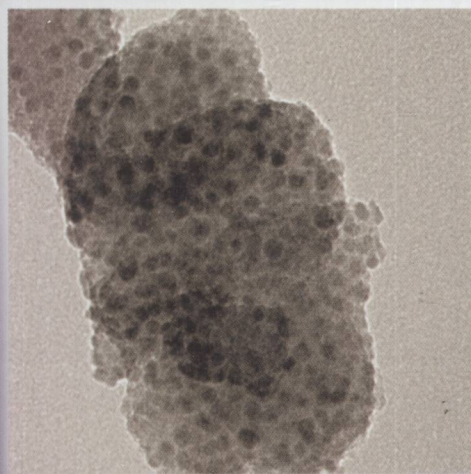


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Preface

Solid catalysts are used in modern energy, chemical and environmental processes. Catalyst performance – activity, selectivity and stability – is largely determined by their preparation. In this respect, catalyst synthesis may be considered as one of the most influential ‘unit operations’ in industry. This book provides an introduction to basic concepts and research tools relevant to catalyst synthesis followed by a number of case studies. In this way it is an introduction to the field of catalyst synthesis for students and newcomers as well as a reference book for experienced scientists and practitioners. I hope that this book will stimulate the research field of catalyst synthesis and that it will support research and applications of solid catalysts by facilitating reliable and reproducible synthesis of materials.

For me it has been a privilege to work with so many colleagues in developing this book. I thank all of the lead authors as well as their co-authors for working with me on this project. It has been rewarding and I hope that we can continue to work together to foster and develop the field of catalyst synthesis.

I would like to thank Jos van Dillen and John Geus. They taught me as a graduate student at Utrecht University that catalyst synthesis is a research topic in its own right. For many years colleagues at the Shell Research Laboratories in Amsterdam provided a stimulating environment to synthesize and use solid catalysts. More recently at Utrecht University, staff, students and postdoctoral fellows have worked with me in the field of catalyst synthesis. Working with them has been a pleasure and is acknowledged.

Utrecht, December 2008

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Abbreviations

<i>AHM</i>	ammonium-hexa-molybdate
<i>BM</i>	base metal
<i>ccp</i>	cubic close packing
<i>CNF</i>	carbon nanofiber
<i>CNT</i>	carbon nanotube
<i>CT</i>	charge transfer
<i>CVD</i>	chemical vapor deposition
<i>D4R</i>	double four-ring
<i>D6R</i>	double six-ring
<i>DFG</i>	Deutsche Forschungsgemeinschaft
<i>DI</i>	dry impregnation
<i>DoE</i>	design of experiment
<i>DP</i>	deposition precipitation
<i>DTG</i>	differential thermal gravimetry
<i>EDF</i>	equilibrium deposition filtration
<i>EDTA</i>	ethylene diamine tetraacetic acid
<i>EDX</i>	energy-dispersive X-ray spectroscopy
<i>EPR</i>	electron paramagnetic resonance
<i>EXAFS</i>	extended X-ray absorption fine structure spectroscopy
<i>FCC</i>	fluid catalytic cracking
<i>FTIR</i>	Fourier transform infrared
<i>hcp</i>	hexagonal close packing
<i>HDMe</i>	hydrodemetallation
<i>HDN</i>	hydrodenitrogenation
<i>HDO</i>	hydrodeoxygenation
<i>HDS</i>	hydrodesulfurization
<i>HPA</i>	heteropolyacid
<i>IA</i>	ion adsorption
<i>ICI</i>	Imperial Chemical Industries
<i>iep</i>	isoelectric point
<i>IE</i>	ion exchange
<i>IL</i>	ionic liquid
<i>IR</i>	infrared

IWI	incipient wetness impregnation
IZA	International Zeolite Association
MAS-NMR	magic-angle sample spinning nuclear magnetic resonance
MMA	methyl methacrylate
MOF	metal organic framework
MRI	magnetic resonance imaging
MTBE	methyl tert-butylether
(M)HC	(mild) hydrocracking
NMR	nuclear magnetic resonance
NM	noble metal
NTA	nitrilo triacetic acid
OHP	outer Helmholtz plane
Pc	phthalocyanine
PMO	periodic mesoporous organosilica
PTA	platinum tetraammine
PZC	point of zero charge
QMS	quadrupole mass spectroscopy
RDP	reduction deposition precipitation
RFC	reactive frontal chromatography
RPA	revised physical adsorption
RT	room temperature
SAPO	SiAlPO ₄
SCR	selective catalytic reduction
SDA	structure-directing agent
SEA	strong electrostatic adsorption
SRGO	straight run gas oil
STY	space time yield
3D	three-dimensional
TEA	triethanolamine
TEDDI	tomographic energy-dispersive diffraction imaging
TEM	transmission electron microscope
TEOS	tetraethylorthosilicate
TMA	tetramethylammonium
TMB	trimethyl benzene
TPA	tetrapropylammonium
TPD	temperature-programmed desorption
TPR	temperature-programmed reduction
2D	two-dimensional
USY	ultrastable Y
UV-VIS	ultraviolet-visible spectroscopy
VOC	volatile organic compound
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction

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