

Report on Habilitation Thesis

“Synthesis of Advanced Nanomaterials: catalytic and Sustainable Applications”

by

Mgr. Manoj B. Gawande, Ph.D.

The habilitation work is focused on a highly actual and important topic, particularly, on nanostructured materials and their application in catalysis. The habilitation work is based on 21 original papers published in impact peer-reviewed journals. It consists of 63 pages commenting the results of author's experimental work, which is devoted to the synthesis of nanomaterials and their applications in catalysis.

The presented scientific papers were published in high-rank journals in the previous five years. The presented work contains also review papers published in prestigious journals, which shows author's deep knowledge in the field of nanostructured catalysts. The papers were published with the affiliation of Palacky University as well as with the author's previous affiliation.

The introduction focuses on general aspects of catalysis as well as effect of nanosized. It contains numerous references to more than 200 papers and it is very detailed. This documents author's deep knowledge of nanomaterials applications in catalysis. The introduction also discusses usage of nanocatalysts in environmental related applications.

The main part of the work is focused on synthesis of nanostructured iron oxides and describes in detail their catalytic applications for reduction of organic compounds like nitro to amine groups. The catalytic reduction reaction was studied in detail for various substrates and also the composition and structure of used catalysis was studied in detail. Huge effort was given also to magnetic nanoparticles and nanostructures with catalytic activity. Magnetic nanostructures based on magnetite and maghemite can be used for catalysts recycling and their repeated use. This topic was studied in detail for a broad spectrum of reactions. The main studied reactions were Suzuki coupling, Heck-Mizuki olefination as well as oxidation and reduction of various hydrocarbons. Magnetic nanoparticle was used as a support for active catalysts like platinum metals as well as various transition metal oxides.

The third chapter focuses on core-shell nanoparticles in catalysis, especially reduction and hydrogenation reactions. The application of complex nanostructures significantly improved catalyst efficiency. The final chapter shows applications of developed nanostructured catalysis for green chemistry reactions like catalysis in aqueous environment. This is currently a rather hot topic of great importance for development of new sustainable technologies in the chemical industry.

The candidate's CV documents his ability to teach and successfully guide students. His scientific results were published in highly impacted journals showing importance and novelty of presented works.

The executed habilitation thesis of Dr. Manoj Gawande can be with no doubt considered as a traditionally structured complex and perspective piece of work, which meets the given standards in this field of study.

On the basis hereof I fully recommend the applicant to be granted the academic title "Docent".



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