

SAJJAD HABIBZADEH, PhD

Current: Post-Doctoral Fellow at

- NSERC industrial chair in coating and surface engineering (CSE)
- NSERC/TOTAL industrial chair in multiphase reaction at extreme conditions

Previous: Electrochemical engineering Lab, department of chemical engineering, McGill University.

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Research area: Nano-surface engineering by employing surface treatment (electrochemical) and surface coating (wet/dry techniques), applied in electro/catalysis and advanced materials / biomedical implants / reaction engineering; multiple layer coatings of ultra-fine particles.

Educations

Doctor of Philosophy (2009-2013)

Electrochemical engineering Lab, department of chemical engineering, McGill University, Montreal, Canada.
Thesis title: Employment of Ir/Ti-oxide coatings and electrochemical polishing of a 316L stainless steel for the enhancement of biocompatibility of metal surfaces.

Master of Science: 2006-2009

University of Tehran, School of Chemical Engineering, catalysis and nanostructured materials Lab, Tehran, Iran.

First honor in minor

Thesis title: Combustion synthesis of doped metal oxide nanoparticles as nanocatalyst for gas sensing and nanofluids.

Bachelor of Science: 2002-2006

Semnan University, Chemical Engineering Department, Semnan, Iran

First Honor

Thesis title: Engineering Thermoplastics applied in automobile industry.

Project Highlights, 2005-2015

Electrochemical engineering:

- Electrocatalytic activity of IrO₂-based electrocatalysts to the reduction of hydrogen peroxide.
- Synthesis and characterization of 3D Ir/Ti-oxide nanoparticle/carbon nanotube cathodes for hydrogen evolution in alkaline electrolyte.
- Micro-leveling of 316L stainless steel and Nitinol by a developed electrochemical polishing method.
- Development of green corrosion inhibitors to improve the corrosion protection of pipe flow lines in oil and gas industry.

Micro- and nano-powder technology:

- Multilayer coatings of fine particles by chemical vapor deposition / atomic layer deposition (CVD/ALD) fluidized bed reactor.
- Novel synthesis of Li₄Ti₅O₁₂ (LTO) as the anode material of Li-ion batteries by fluidized bed chemical vapor deposition (FBR-CVD).
- Chemical vapor deposition (CVD) of high refractive index (TiO₂) and low refractive index (SiO₂) metal oxides at low and atmospheric pressure.

- Design of a semi-pilot CVD fluidized bed reactor using for fine powders with irregular morphology (ordered by Viavi Solutions Inc.)
- Prolysis of polymer in a newly-designed reactor

Biomedical application:

- Development a new quantitative method to measure radiopacity of biomedical implants.
- Enhancement of radiopacity (visibility) of biomedical implant via iridium-based oxide coating.
- Cells (endothelial and smooth muscle cells)/platelet-surface interaction analysis for biomedical application.

Catalytic activity:

- Catalytic activity of oxygen storage metal-oxides in the three-way catalyst (TWC) for oxidation of CO and hydrocarbons.
- Photocatalytic activity of nanostructure 1D TiO₂ synthesized by novel techniques (i.e., solution combustion synthesis, polyacrylamide gel, etc)
- Synthesis and characterization of various metal oxides such as, SnO₂, SiO₂, TiO₂, IrO₂ and HfO₂, etc (applied in nanofluids and coatings).

Publications

• **Journal articles:**

- M. Shahrezaei, A.A. Babaluo, **S. Habibzadeh**, H. Hosseinkhani, “Photocatalytic properties of 1D TiO₂ nanostructures prepared by a novel polyacrylamide gel-synthesized titanium oxide”, submitted to Nanotechnology, 2015.
- M. Shahrezaei, A.A. Babaluo¹, H. Hosseinkhani, **S. Habibzadeh**, “Study of synthetic parameters and photocatalytic activity of TiO₂ Nanostructures”, submitted to Powder Technology, 2015.
- **S. Habibzadeh**, L. Li, S. Omanovic, D. Shum-Tim and E.C. Davis, “Electrochemical Polishing as a 316L Stainless Steel Surface Treatment Method: Towards the Improvement of corrosion stability”, Corrosion Science, 87 (2014) 89-100.
- **S. Habibzadeh**, L. Li, S. Omanovic, D. Shum-Tim and E.C. Davis, “Biocompatibility of Ir/Ti-oxide coatings: Interaction with platelets, endothelial and smooth muscle cells”, Applied Surface Science, 301(2014) 530–538.
- **S. Habibzadeh**, D. Shum-Tim and S. Omanovic, “Surface and Electrochemical Characterization of Ir/Ti-Oxide Coatings: Towards the Improvement of Radiopacity for Coronary Stent Application”, International Journal of. Electrochemical Science, 8 (2013) 6291 – 6310.
- **S. Habibzadeh**, A. Kazemi, A. A. Khodadadi, Y. Mortazavi, S. Omanovic, M. Shariaty-nyasar, “Thermal conductivity and stability of nanofluids of tin dioxide synthesized via microwave-induced combustion route”, Chemical Engineering journal, 156 (2010) 471-478.
- **S. Habibzadeh**, A. A. Khodadadi, Y. Mortazavi, “Sm₂O₃-doped SnO₂ nanoparticles via microwave-induced combustion synthesis for selective sensing of CO”, Sensors and Actuator B: Chemical, 144 (2010) 131–138.
- **S. Habibzadeh**, A. A. Khodadadi, Y. Mortazavi, “Novel microwave-induced combustion synthesis of SnO₂ nanoparticles for selective sensing of CO using tin chloride”, Journal of Nanoscience and Nanotechnology, 10 (2010) 6003-6008.
- A. Mohaddespour, H. Abolghasemi, M. Torab Mostaedi, **S. Habibzadeh**, “A new model for estimation of the thermal conductivity of polymer/clay nanocomposites”, Journal of Applied Polymer Science, 118, 1042–1050 (2010).

• **Conference presentation:**

- **S. Habibzadeh**, O. Zabeida, L. Martinu, J.E. Sapheia and J. Chaouki, “Conformal multilayer thin film on silica microspheres by atmospheric fluidized bed chemical vapor deposition”, Fluidization XV 2016, Canada.
- **S. Habibzadeh**, G. Hirode and S. Omanovic, “Electropolishing of 316L Stainless Steel for Biomedical Applications: The Influence of Potential”, ECS 223 meeting, Toronto, ON, Canada, 12-16 May 2013.

- **S. Habibzadeh**, G. Hirode, D. Shum-Tim and S. Omanovic, “Electrochemical Surface Treatment of 316L Stainless Steel for Biomedical Applications”, ECS Bioelectrochemistry, Bochum, Germany, 21-26 March, 2013.
- **S. Habibzadeh**, D. Shum-Tim and S. Omanovic, “Characterization of iridium/Titanium oxide coatings for biomedical applications”, World conference on regenerative medicine, 1-4th November 2011, Leipzig, Germany
- **S. Habibzadeh**, A.A.Khodadadi, A.Kazemi, N. Hosseinpour, Y.Mortazavi, “Colloidal stability of nanofluids of tin dioxide synthesized via microwave-induced combustion route”, the 8th World Congress of Chemical Engineering, Montreal, 2009.
- N. Hosseinpour, Y.Mortazavi, A.A.Khodadadi, A.Bazyari, **Sajjad Habibzadeh**, “LaCoO₃ and LaFeO₃ promoters for enhanced oxidation of CO formed in dense-catalyst region of FCC regenerators”, the 6th World Congress on Oxidation Catalysis - Lille 2009.
- **S. Habibzadeh**, Y. Mortazavi, A. A. Khodadadi, “Novel Microwave-Induced Combustion Synthesis of SnO₂ Nanoparticles for CO Sensor Using Tin Chloride”, 1st International conference from Nanoparticles & Nanomaterials to Nanodevices & Nanosystems, 16-18th Jun 2008, Halkidiki, Greece.
- **S. Habibzadeh**, M.M.Montazer-Rahmati, “Mathematical modeling for adsorption of propane and propylene in zeolite 4A honeycomb monolith”, 5th International Chemical Engineering Congress, paper ID: 04241, 2-5th January 2008, Kish Island, Iran.
- A. Mohadespour, S. Fatemi, S. Jafarnejad, **S. Habibzadeh**, “Modeling and optimization of reforming reaction of heavy hydrocarbons in catalytic fluidized beds”, The 11th Iranian Chemical Engineering Congress, paper ID: 03210, 28-30th November 2006, Tehran, Iran.

Experiences

- **Post-doctoral fellow (2013-present)**, NSERC industrial multiphase reaction; coating and surface engineering (CSE), Montreal, Canada. The project is conducted in collaboration with Viavi solutions Inc. from USA.
- **Research Assistant (2009-2013)**, Surface engineering and Electrochemistry laboratory, department of chemical Engineering, McGill University, Montreal, Canada. The project was conducted in collaboration with Boston Sci., from USA.
- **Research Assistant**, 2007-2009, Catalysis and Nanostructured Materials Laboratory, Nanoscience and Nanotechnology Research Center, University of Tehran, Tehran, Iran
- **Project manager and advisor**, 2007-2009, Science and Technology Research Institute, Tehran, Iran
- **Teaching Assistant**, Heat and Mass transfer, CHEE315, McGill University, Montreal, Canada
- **Teaching Assistant**, Fluid Mechanics, CHEE300, McGill University, Montreal, Canada
- **Teaching Assistant**, Introduction to chemical engineering, CHEE210, McGill University, Montreal, Canada
- **Teaching Assistant**, Physical chemistry for engineers, CHEE310, McGill University, Montreal, Canada
- **Teaching Assistant**, Unit Operation in chemical engineering, Semnan University, Semnan, Iran

Software programs for:

- Tray by tray calculations of the distillation of hydrocarbon multicomponent Mixtures with narrow range of K-values.
- Adsorption of hydrocarbon systems for complex fixed bed adsorbent
- Pressure-Temperature flash calculation

Technical skills

- Characterization of electrocatalysts in alkaline and acidic electrolyte by different techniques: Cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS), linear tafel polarization (LTP).
- Experimental setup design for fluidized bed/chemical vapor deposition (FB-CVD) reactor for nano-catalyst production.
- Experimental setup design for heterogeneous catalytic reactions with automatic control.
- Characterization of catalysts by different techniques, e.g. BET, Pycnometry, FT-IR, TPR/TPO, XRD, SEM/EDX and TEM.

- Surface characterizations- X-ray photoelectron spectroscopy (XPS), Atomic force microscopy/Kelvin-Probe (AFM/KP).
- Zeta potential, Particle size distribution (PSD).
- Identification and separation by gas chromatography (GC).
- Applying of metal oxides, their composite and doped in gas sensing process.
- Applying of noble metal oxide in the stent coatings, water treatment and semiconductor application.
- Electrochemical experiments: Electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) of coated samples.

Awards

- RGC (Research grant council)'s external reviewer, Hong Kong, China, 2010-present.
- McGill Engineering Great Award, McGill University, 2013.
- Graduate Excellence Fellowships (GEF), McGill University, 2012.
- Graduate Excellence Fellowships (GEF), McGill University, 2011.
- Lars and Alberta fellowship, McGill University, 2010.
- Iranian Nanotechnology Initiative Organization Award, 2010.
- McGill Engineering Doctoral Award (MEDA), McGill University, 2009.
- Iranian Nanotechnology Initiative Organization Award, 2009.
- Iranian Nanotechnology Initiative Organization Award, 2007.
- Iranian Elite National Foundation Award, 2008.
- Iranian Association of Chemical Engineering Award, 2006.
- Semnan University, Chemical Engineering Department First-Honor Award, 2006.

Referee/Reviewer

- Chemical Engineering Journal
- Powder Technology
- Water research
- Sensor and Actuator B: chemical
- Microchimica Acta
- Materials
- Journal of Electrochemical Science and Engineering
- Journal of Engineering Science & Technology

References

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