Yin Jing

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Work Experience

Research Assistant
University of Illinois at Chicago – Chicago, IL – May 2014 to Present
I worked as a research assistant in Prof. Brian P. Chaplin's lab at UIC. During this period, I have,

- Successfully developed the membrane fouling theory using electrochemical impedance spectroscopy, and applied to study the fouling and defouling behavior on a substoichiometric TiO_2 reactive electrochemical membrane;
- Developed a chemical free electrochemical regeneration scheme to recover the membrane with excellent flux recovery and extremely low cost;
- Investigated the validity of several hydroxyl radical probes used in the electrochemical advanced oxidation processes;
- Developed the methodology of ion transport through a polycarbonate track etched membrane using scanning electrochemical microscopy on both the experimental and theoretical bases;
- Developed the methodology of local resolution of kinetic variation on the passivation study of a substoichiometric TiO_2 electrode.

ABET Accreditation Assistant
University of Illinois at Chicago – Chicago, IL – August 2013 to May 2014
I worked to assist the accreditation of STEM ABET of chemical engineering department at UIC in 2013 under Prof. Ludwig Nitsche. My responsibilities included organizing student performance data, communicating with professors and lecturers to collect the supportive document and building the certificate website.

Teaching Assistant
University of Illinois at Chicago – Chicago, IL – August 2012 to May 2013
I worked as a teaching assistant for CHE 210 (Material and Energy Balances) and CHE 512 (Microhydrodynamics, Diffusion and Membrane Transport), and my responsibilities were grading students' homework and quizzes, holding office hours, as well as leading the discussion class once in a week for CHE 210.

University of Dayton – Dayton, OH – August 2010 to May 2012
I worked as a teaching assistant for CME 311 (Chemical Engineering Thermodynamics) and CME 365 (Separation Techniques), and was responsible to grade students' homework and organize the lecturer's class notes.

Education

- **Ph.D. in Chemical Engineering**
  University of Illinois at Chicago – Chicago, IL
  August 2012 to August 2017 (Expected)

- **Master's in Chemical Engineering**
  University of Dayton – Dayton, OH
  August 2010 to July 2012

- **Bachelor's in Chemical Engineering**
  Shenyang University of Chemical Technology – Shenyang, Liaoning
  September 2005 to June 2009

Skills

Electrochemical Characterization Instrument, Membrane Characterization Techniques, Numerical Simulations and Computer Programming

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Patent

- Chaplin, B. P.; Guo, L; **Jing, Y**; Nayak, S. 2016. Ultrafiltration TiO_2 Magnéli phase reactive electrochemical membranes. U.S. Patent Application 15/365,252, filed on Nov. 30th, 2016. Patent Pending

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Publications

- **Jing, Y**.; Chaplin, B. P. *A Mechanistic Study of the Validity of Using Hydroxyl Radical Probes to Characterize Electrochemical Advanced Oxidation Processes*. **Environ. Sci. Technol.** 2017, 51 (4), 2355–2365.
- **Jing, Y**.; Guo, L.; Chaplin, B. P. *Electrochemical impedance spectroscopy study of membrane fouling and electrochemical regeneration at a sub-stoichiometric TiO_2 reactive electrochemical membrane.* **J. Memb. Sci.** 2016, 510, 510–523.
- **Jing, Y**.; Chaplin, B. P. *Electrochemical impedance spectroscopy study of membrane fouling characterization at a conductive sub-stoichiometric TiO_2 reactive electrochemical membrane: Transmission line model development*. **J. Memb. Sci.** 2016, 511, 238–249.
- Guo, L.; **Jing, Y**.; Chaplin, B. P. *Development and Characterization of Ultrafiltration TiO_2 Magnéli Phase Reactive Electrochemical Membranes*. **Environ. Sci. Technol.** 2016, 50 (3), 1428–1436.

- Santos, M. C.; Elabd, Y. A.; **Jing, Y**.; Chaplin, B. P.; Fang, L. *Highly porous Ti_4O_7 reactive electrochemical water filtration membranes fabricated via electrospinning/electrospraying*. **AIChE J.** 2016, 62 (2), 508–524.

Presentations

- **Y. Jing**, B.P. Chaplin, "Mechanisms of organic compound fouling on a sub-stoichiometric titanium dioxide reactive electrochemical membrane," Oral Presentation: ***2014 ACS 248th National Meeting***, San Francisco, CA, Aug. 10th, 2014;
- **Y. Jing**, L. Guo, B.P. Chaplin, "Electrochemical Impedance Spectroscopy Study of Reactive Electrochemical Membrane Fouling and Development of a New Regeneration Scheme," Poster Presentation: ***2015 North American Membrane Society***, Boston, MA, May 21st, 2015;
- **Y. Jing**, L. Guo, B.P. Chaplin, "Electrochemical Impedance Spectroscopy Study of Membrane Fouling Characterization at a Conductive Sub-Stoichiometric TiO_2 Reactive Electrochemical Membrane," Oral Presentation: ***2016 AIChE Midwest Regional Conference***, Chicago, IL, Mar. 4, 2016;
- **Y. Jing**, L. Guo, B.P. Chaplin, "Electrochemical Impedance Spectroscopy Study of Membrane Fouling Characterization at a Conductive Sub-Stoichiometric TiO_2 Reactive Electrochemical Membrane," Oral Presentation: ***2016 ACS 251st National Meeting***, San Diego, CA, Mar. 17, 2016;
- **Y. Jing**, B.P. Chaplin, "Membrane Fouling and Electrochemical Regeneration at a Sub-Stoichiometric TiO_2 Reactive Electrochemical Membrane," Oral Presentation: ***2016 AIChE Annual Meeting***, San Francisco, CA, Nov. 17, 2016

Work in Progress

- "Localized Study of the Surface Passivation and Recovery on a substoichiometric TiO_2 Material using Scanning Electrochemical Microscopy"
  Status: Manuscript in preparation

  Abstract: Substoichiometric TiO_2 has been deemed as one of most promising electrode materials used in electrochemical advanced oxidation processes, due to its ability to produce hydroxyl radicals from water oxidation and low cost. It, however, suffers from gradual conductivity deterioration, known as surface passivation, as a result of oxygen-reinsertion into the lattice structure during long term anodic polarization. In this study, a novel substoichiometric TiO_2 disk membrane was synthesized in a thermal reduction process, and the surface passivation and recovery were examined in various electrolyte solutions by electrochemical methods and X-ray diffraction (XRD). Scanning electrochemical microscopy was employed to provide spatial visualization of both phenomena, and measure local kinetic change through the charge transfer of a redox reaction, while XRD was used to identify the phase change of this crystalline material.

Results of this study provided a great understanding of the surface passivation and recovery on the substoichiometric TiO_2 material, and are fundamental to develop the electrode material with long term stability.

- "Localized Study of the Long-Term Stability of a Fluorinated Boron Doped Diamond Electrode using Scanning Electrochemical Microscopy"
  Status: Data collection in progress

  Abstract: The use of boron doped diamond (BDD) electrodes is limited by the formation of perchlorate when they are used during the electrolysis of chloride-containing water, since perchlorate is difficult to remove and responsible for the disruption of the endocrine and reproductive systems. Fluorinated BDD using silanization method has exhibited great potential in limiting the formation of perchlorate without affecting the rates of organic compound oxidation significantly, however, this fluorinated BDD suffers from long-term stability under anodic polarization, and therefore loses its functionality eventually. In this study, the long-term stability of fluorinated BDD was examined by several electrochemical methods, X-ray photoelectron spectroscopy (XPS) and Energy-dispersive X-ray spectroscopy (EDS). Scanning electrochemical microscopy was adopted to visually and locally resolve the stability through the charge transfers between redox couples of different charges (positive, neutral and negative). Cyclic voltammetry was used to investigate changes in the electrochemical response for the bulk surface. The changes to the electrode surface functional groups and surface elements were examined by XPS and EDS. Results of this study provided a fundamental understanding of the long-term stability of fluorinated BDD using silanization method.