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*Promoting Catalytic  
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**Catalysis Club of Philadelphia**

**Thursday, January 16<sup>th</sup>, 2020**

Crowne Plaza Wilmington North

630 Naamans Road, Claymont, DE 19703

**Speaker: Prof. Michael Tsapatsis**

***Catalysis Club of Philadelphia January Meeting***

*Johns Hopkins University*

**2-Dimensional Zeolite Catalysts and Membranes**

**Meeting Schedule:**

*Social Hour* ..... 5:30 PM

*Dinner* ..... 6:30 PM

*Meeting* ..... 7:30 PM

**Meeting Fees:**

*Members:* \$40.00

*Non-Members:* \$45.00

*Stud. & Retired Members:* \$25.00

**Menu**

*Chicken noodle soup, Crowne salad,  
Carrot cake desert, and your choice of  
3 entrees:*

- 1) Slow roasted prime rib – *Served with Au Jus and horseradish*
- 2) Cajun Seared Salmon – *Rubbed with Cajun spices, topped with creole cream sauce*
- 3) Vegan Pasta – *Served with oven roasted seasonal vegetables*

**Meal reservations** – Please register online by **Friday,**

**January 10<sup>th</sup>** at

<http://catalysisclubphilly.org/>

or notify your company

representative or our

Treasurer Josh Pacheco

([Josh.Pacheco@pqcorp.com](mailto:Josh.Pacheco@pqcorp.com))

or Chair Jacob Dickinson

([Jacob.G.Dickinson@dupont.com](mailto:Jacob.G.Dickinson@dupont.com))

**Membership** - Dues for the 2019-20 season will be \$25.00 (\$5.00 for the local chapter and \$20.00 for the national club). Dues for students, post-docs and retirees will be \$10.00 (\$5.00 for local club and \$5.00 for national club).

# Catalysis Club of Philadelphia

Thursday, January 16<sup>th</sup>, 2020

Crowne Plaza Wilmington North

630 Naamans Road, Claymont, DE 19703



**Prof. Michael Tsapatsis**

## **2-Dimensional Zeolite Catalysts and Membranes**

*Johns Hopkins University, Chemical and Biomolecular Engineering*

**Abstract:** MFI is a widely used zeolite catalyst and adsorbent, which also holds promise as a thin film membrane for the separation of hydrocarbon isomers and other difficult to separate mixtures. 2-dimensional (2D) MFI nanosheets can be used as thin film zeolite membranes and hierarchical catalysts for applications in membrane science, catalysis, and reaction engineering.

In this talk, I will briefly review our contributions in 2D-MFI membranes and catalysts starting from our early work on oriented membranes and crystal morphology control (*Science* 300, 456-460 (2003)), which lead to the introduction of exfoliated 2D-MFI (*Science* 334, 72-75 (2011)), the discovery of self-pillared 2D-MFI catalysts (*Science* 336, 1684-1687 (2012)), and the development a new crystal growth mechanism leading to directly synthesized MFI nanosheets (*Nature* 543, 690-694 (2017)).

I will then present recent unpublished work on commensurate knitting of 1-dimensional MEL (1D-MEL) in 2D-MFI and its implications in transport and mechanical properties and potential applications in isomerization membrane reactors. I will also discuss our efforts to quantitatively describe reaction and diffusion in 2D and thicker MFI nanosheets (*AIChE Journal* 65(3), 1067-1075 (2019)) using classical reaction-diffusion models. I will close with unexpected findings regarding nanosheet coarsening in the presence of superheated steam and its implications for regulating external surface catalysis by 2D-MFI.

**Speaker Details:** Michael Tsapatsis is a Bloomberg Distinguished Professor of Chemical and Biomolecular Engineering at Johns Hopkins University (JHU) with a joint appointment in the Applied Physics Laboratory. Before joining JHU (September 1, 2018) he was on the faculty of the Department of Chemical Engineering and Materials Science at the University of Minnesota (2003-2018) and in the Chemical Engineering Department at the University of Massachusetts Amherst (1994-2003). He received an Engineering Diploma (1988) from The University of Patras, Greece, and MS (1991) and Ph.D. (1994) degrees from the California Institute of Technology (Caltech) working with G.R. Gavalas. He was a post-doctoral fellow with M.E. Davis at Caltech (1993/94). His research interests are in the design of materials for uses in separations, catalysis and reaction engineering.

