# Catalysis Club of Philadelphia

**Thursday, March 24th, 2016**
DoubleTree Hotel
4727 Concord Pike Wilmington, DE 19803

## Identification of active sites for methyl lactate dehydration on faujasites

Bingjun Xu
*Assistant Professor of Chemical and Biomolecular Engineering*
*University of Delaware*

**Social Hour:** **5:30 PM**
**Dinner:** **6:30 PM**
**Meeting:** **7:30 PM**

**Members:** $35.00
**Walk Ins & Non-members:** $40.00
**Student & Retired Members:** $20.00

***Menu****

**Salmon Romanesco** – salmon with romesco sauce served with creamy polenta and broccoli rabe

**Roasted Pork** – fennel, orange crushed red pepper served with parmesan polenta and brussels with pancetta

**Steamed Vegetables** – atop brown rice

**All dinners served with a classic Caesar salad, rolls and butter, chef's choice of desserts, coffee, tea, iced tea, decaf, and water.*

**Meal reservations** - Please notify your company representative or Alex Mironenko (alexmir@udel.edu) by ***Thursday, March 17th*** , or register online: http://catalysisclubphilly.org/program/ meeting-registration/

**Membership** - Dues for the 2015-16 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).

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## Identification of active sites for methyl lactate dehydration on faujasites

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The dwindling reserve of crude oil and surge in natural gas production is rapidly changing the mix of the carbon source pool for the production of fuels and chemical feedstocks, and in turn creating shortages of several key commodity chemicals, e.g., propylene and butadiene. The shortage of certain commodity chemicals, such as propylene, drives up their prices, which in turn raises the cost of the downstream chemicals, such as acrylic acid. In this regard, lignocellulosic biomass derived feedstocks, e.g., lactic acid and its esters, can potentially bridge the gap. Currently, the commercial fermentation process using biomass-derived sugars can achieve a lactic acid (or its esters) yield of up to 90%. The absence of efficient and selective catalyst for lactic acid dehydration is the main missing link in the production of renewable acrylic acid. The primary roadblock for the rational design of catalysts for lactic acid dehydration is the lack of the mechanistic understanding of the nature of active sites and mechanistic steps leading to the selective removal of the $\alpha$-hydroxyl group by dehydration. Through kinetic and in-situ spectroscopic investigations, we identify the dehydration reaction proceeds through dissociative adsorption, acid-mediated dehydration, and associative desorption steps. These mechanistic insights will guide the design of selective catalysts for this reaction.

**Speaker Bio**:

Bingjun Xu is currently an Assistant Professor in the Department of Chemical and Biomolecular Engineering at University of Delaware. Dr. Xu received his Ph.D. in Physical Chemistry, advised by Prof. Friend, from Harvard University in 2011. His thesis established a mechanistic framework for oxidative coupling reactions on Au surface through surface science studies. Dr. Xu worked with Prof. Davis at Caltech on the development of a low temperature, manganese oxide based thermochemical cycle for water splitting. Upon finishing his postdoc, he joined University of Delaware in the fall of 2013. The current research interest of the Xu lab spans heterogeneous catalysis, electrocatalysis and in-situ spectroscopy.