University of Louisville
Department of Chemistry
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Literature Seminar

When: March 2, 2023
Time: **12:00 p.m**.
Location: CBLL-16

Transition Metal Oxide catalysts for Oxygen Evolution Reaction (OER)

Abstract:

Sustainable and clean energy sources is very much essential for our current global energy crisis because of the consumption of the abundant fossil fuel and consequently produce environmental pollutant like CO_2, SO_x, NO_x as well as greenhouse gases. So, it become urgent to explore clean and sustainable energy sources. Hydrogen economy has become a promising alternative way where hydrogen fuel produces from water electrolysis[1]. So, the important of water electrolysis attract global attention. Water electrolysis in alkaline media has become much more prominent due to effective nobel-metal-free electrocatalyst as well as large scale industrialization is possible.[1] Therefore understanding of water electrolysis attract the attention of current renewable energy research where Oxygen Evolution Reaction (OER) happening in anode and Hydrogen Evolution Reaction (HER) in cathode. OER is overall 4-electron transfer pathway whereas HER is 2-electron transfer pathway[2]. So, a good electrocatalyst is needed to accelerate the kinetically sluggish OER reaction. Currently, nobel-metal free perovskite oxide has become prominent in heterogenous catalyst due to its low cost and long-term durability during OER in harsher alkaline condition. as an example, gradually incorporation of Sr-metal in $La_{1-x}Sr_xFeO_{3-\delta}$ compound increase their bulk surface area and also gradually increase the oxygen vacancy which play a good catalytic activity for OER[3]. Also, incorporation of Co-Metal on that material and performing the surface reduction by $NaBH_4$ grows a thin amorphous layer on the bulk surface as well as reduce moderate amount of Co^{3+} to Co^{2+} consequently generate oxygen vacancy which play a role in the catalytic activity[4]**.** However, substitution of moderate amount of Ni and Co in $Sr_2FeMoO_{6-\delta}$ for synthesizing $Sr_2Fe_{0.8}Co_{0.2}Mo_{0.65}Ni_{0.35}O_{6-\delta}$ consequently generate oxygen vacancy and also changes the metal oxidation state which eventually play a part in catalytic activity[5].

References:

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3. Sixuan She, Jie Yu, Wanqi Tang, Yinlong Zhu, Yubo Chen, Jaka Sunarso, Wei Zhou, and Zongping Shao; ACS Appl. Mater. Interfaces 2018, 10, 11715−11721.
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