

Pittsburg State University

Pittsburg State University Digital Commons

Posters

2019 Research Colloquium

4-1-2019

Molybdenum Oxides for Energy Generation and Storage Using Efficient Clean Method

Camila Zequine

Pittsburg State University

Pawan K. Kahol

Pittsburg State University

Ram K. Gupta

Pittsburg State University

Follow this and additional works at: https://digitalcommons.pittstate.edu/posters_2019

 Part of the [Energy Systems Commons](#)

Recommended Citation

Zequine, Camila; Kahol, Pawan K.; and Gupta, Ram K., "Molybdenum Oxides for Energy Generation and Storage Using Efficient Clean Method" (2019). *Posters*. 65.

https://digitalcommons.pittstate.edu/posters_2019/65

This Article is brought to you for free and open access by the 2019 Research Colloquium at Pittsburg State University Digital Commons. It has been accepted for inclusion in Posters by an authorized administrator of Pittsburg State University Digital Commons. For more information, please contact digitalcommons@pittstate.edu.

Molybdenum Oxides for Energy Generation and Storage Using Efficient Clean Method

Camila Zequine, Pawan K. Kahol, Ram K. Gupta
Pittsburg State University, Pittsburg, KS, United States

Introduction

- ❑ Owing the crisis energy and the potential degradation of the environment, it is extremely important to develop new materials capable of generating green energy and storing this energy with high efficiency and low cost.
- ❑ Water electrolysis is the promising pathway for sustainable oxygen production.
- ❑ Transition metal oxides are very attractive for these applications due to their low-cost and rich electrochemical properties.

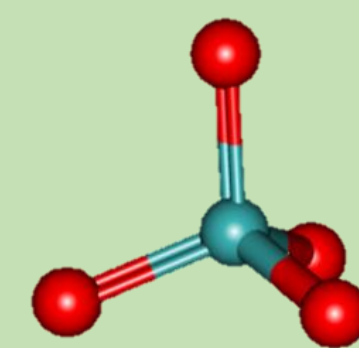


Challenges

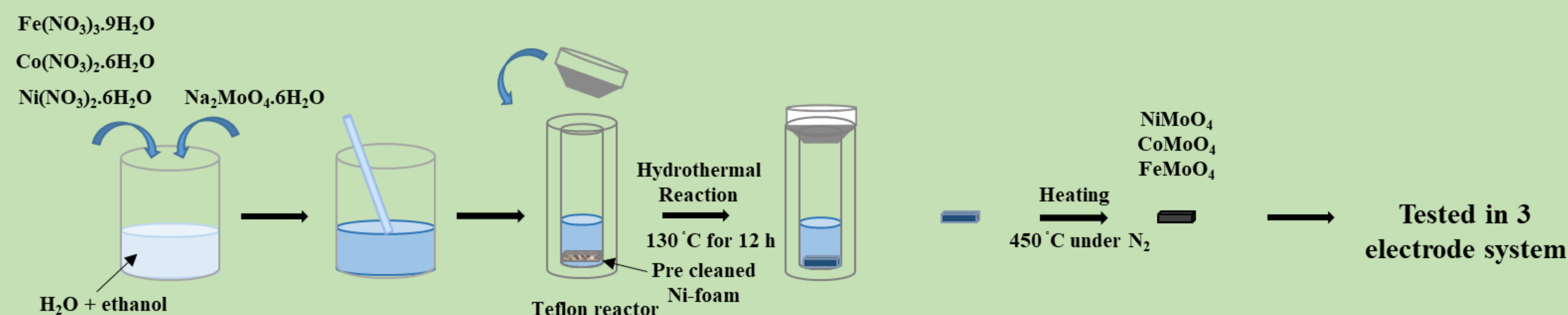
- ❑ The most efficient electrocatalysts for water splitting are RuO_2 and IrO_2 for oxygen evolution reaction (OER). However, their high cost and lack of abundance, limit their applications as catalysts.
- ❑ An ideal electrocatalyst should provide high current density at a lower overpotential.

Solution through our research

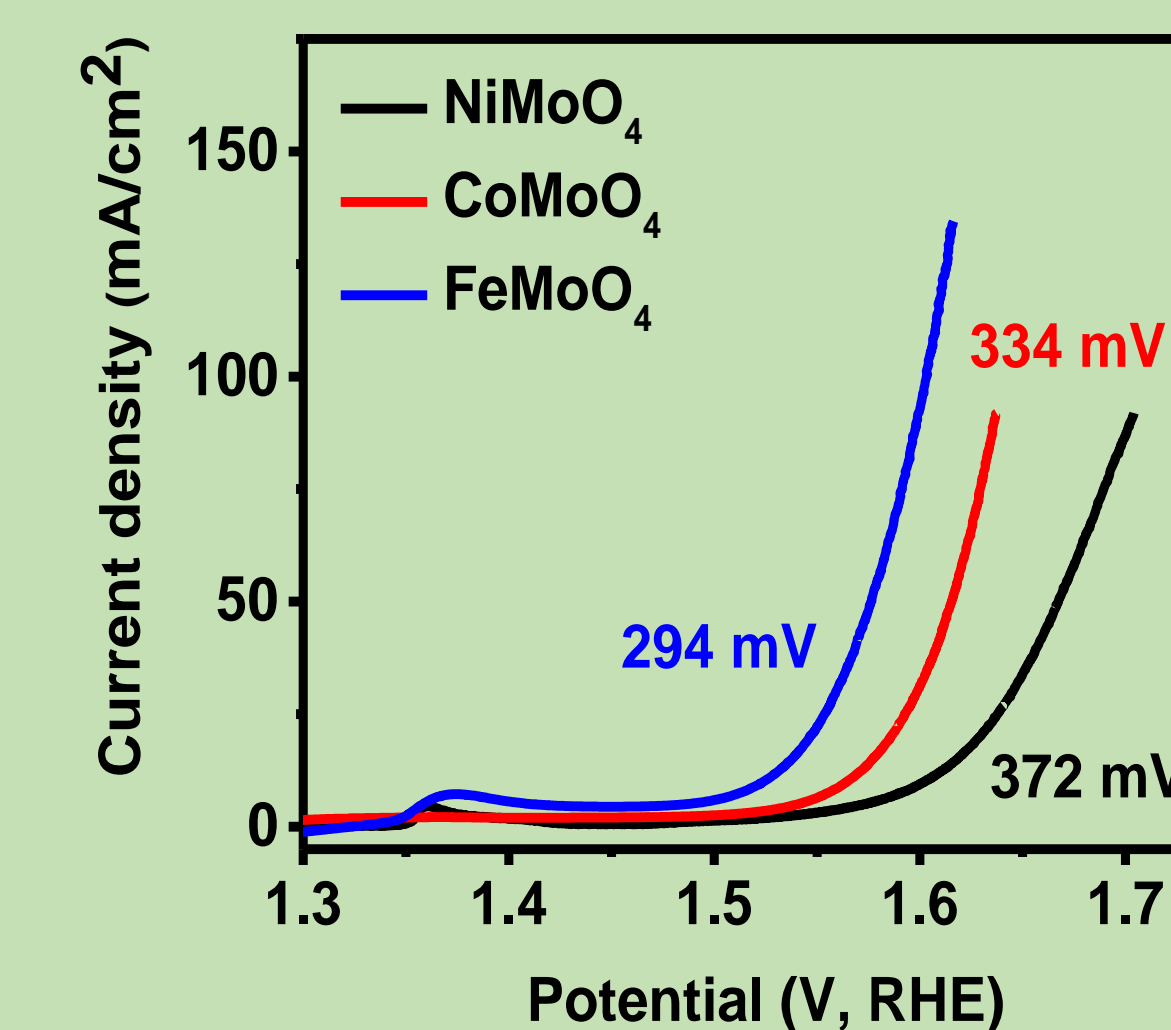
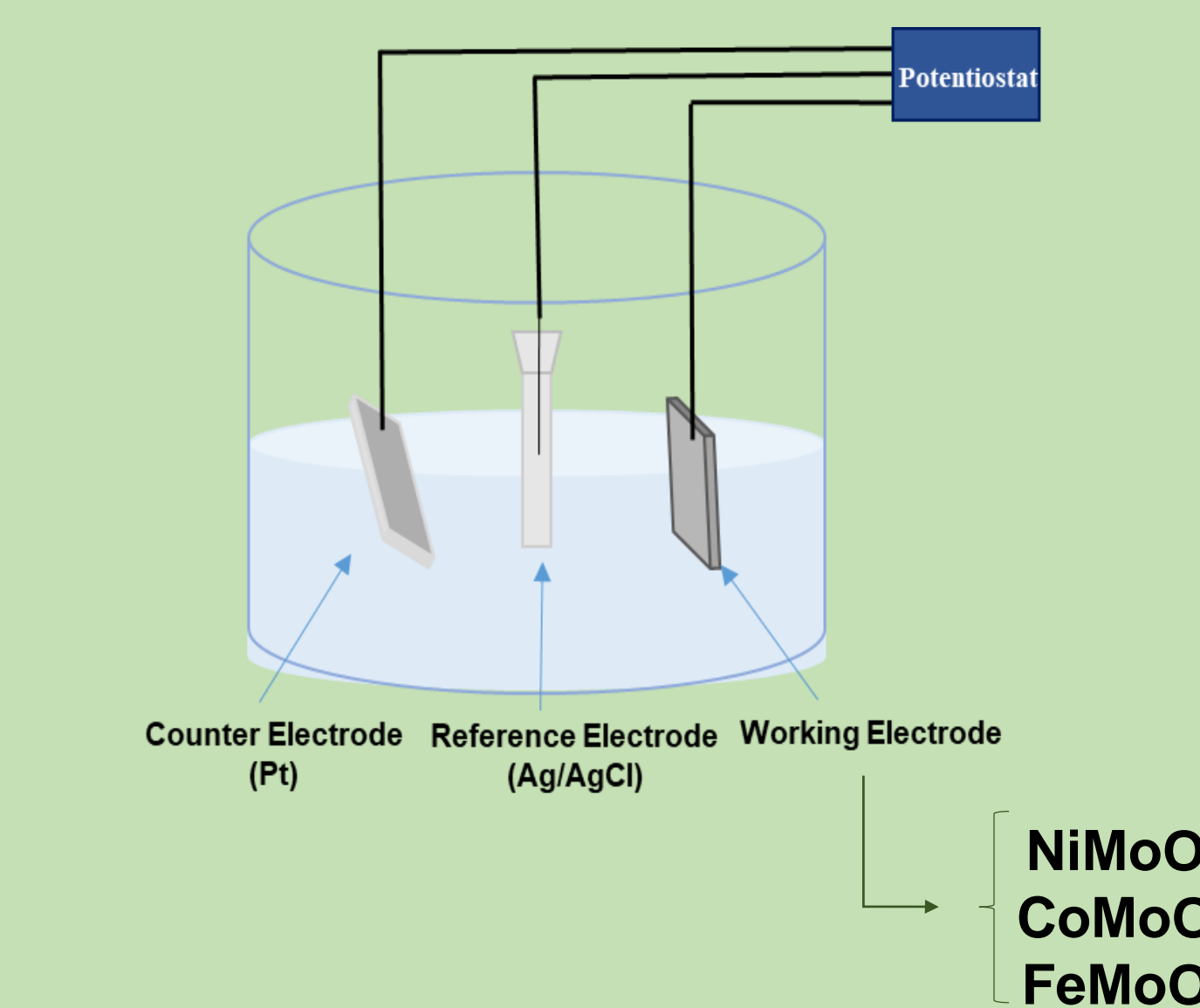
- ❑ Development of materials for OER with excellent electrochemical properties, economically viable and earth abundant.
- ❑ Development of energy storage devices (Supercapacitor).
- ❑ Research efforts focused in the synthesis of nickel, cobalt and iron molybdates as electrocatalysts.



Experimental



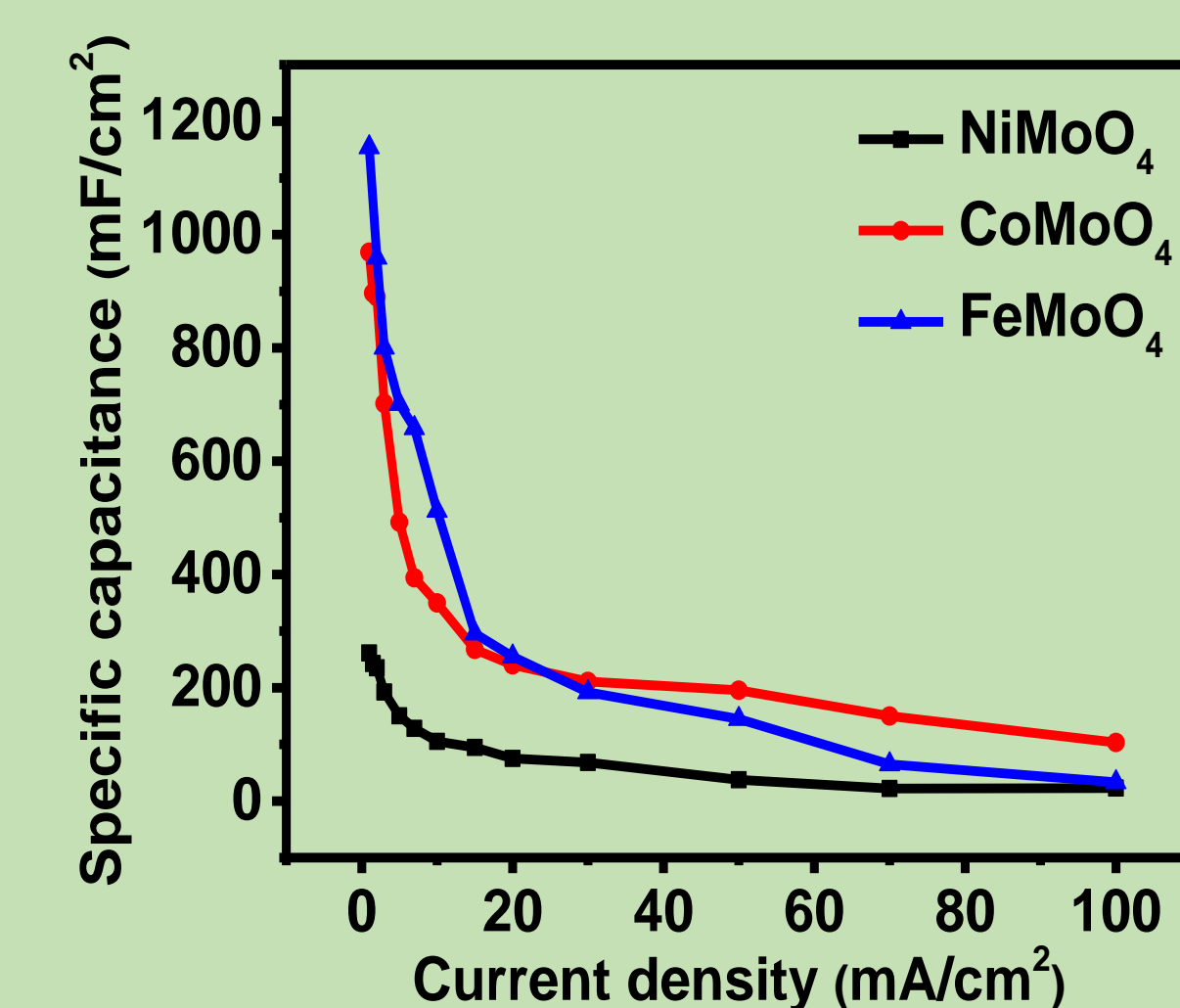
Results and discussion



FeMoO_4

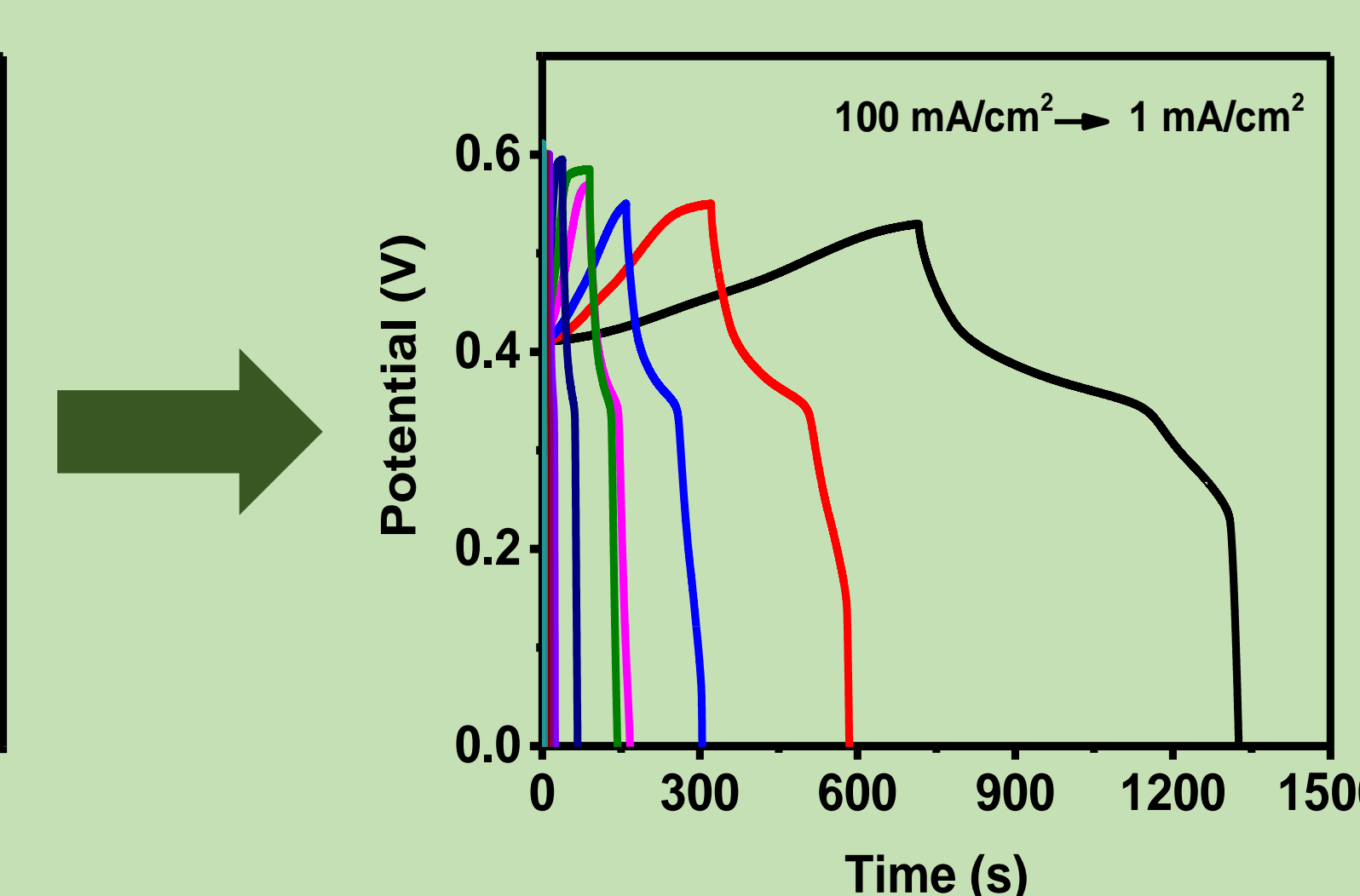
Lowest overpotential

Better energy generation



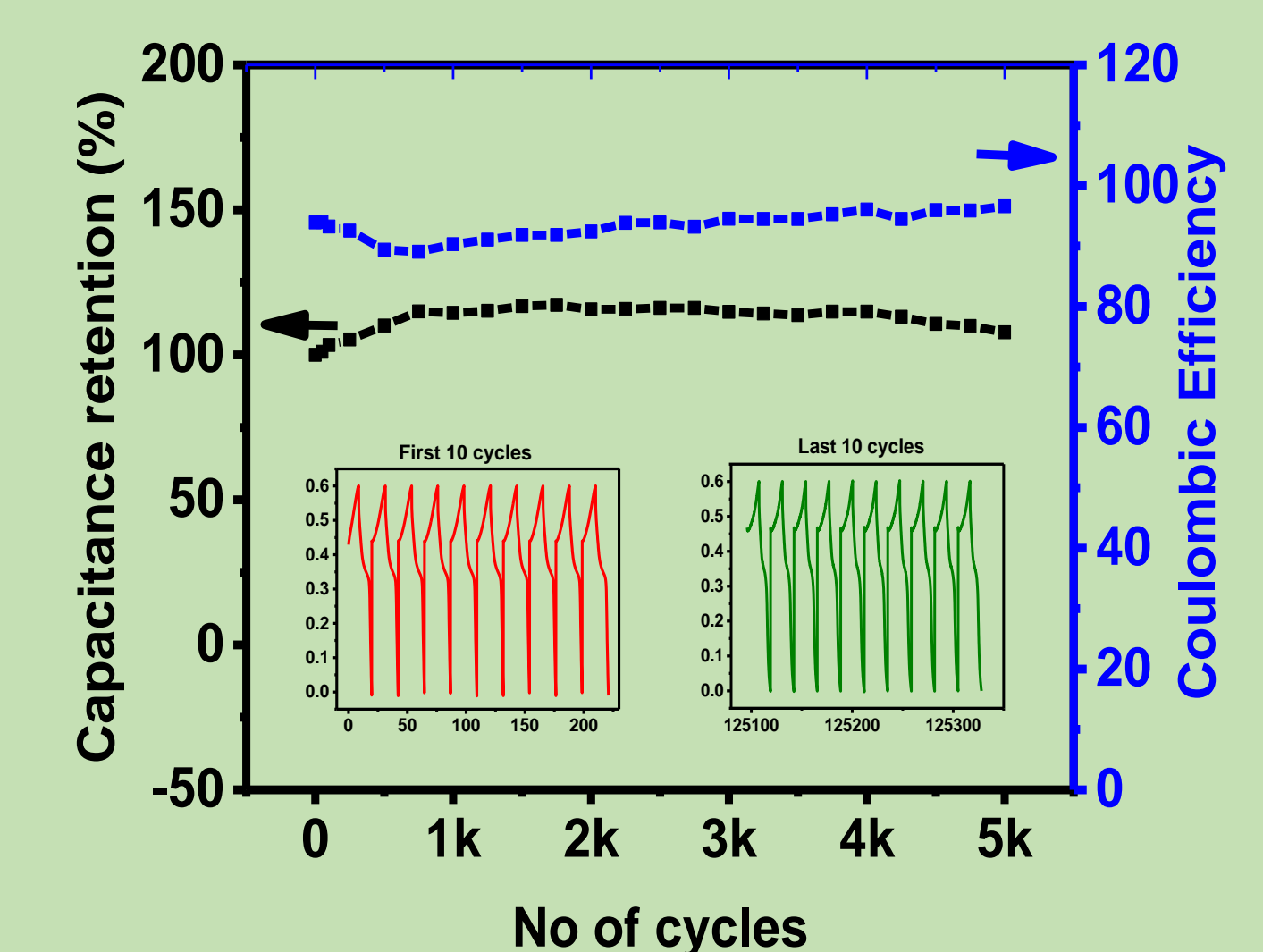
FeMoO_4

Highest capacitance



Long charge-discharge process

Better energy storage



Excellent capacitance retention and coulombic efficiency over 5,000 cycles

Conclusion and Future Work

- ✓ Molybdenum-based metal oxides could be promising materials for the advancement of energy generation and storage devices.
 - ✓ FeMoO_4 can produce oxygen efficiently and it shows excellent performance as supercapacitor.
- Future work:** Study the effect of morphology on the electrochemical properties of the electrocatalysts.

Acknowledgement

Sincere acknowledgment to the Polymer Chemistry Program and Kansas Polymer Research Center for providing research facilities.