

Development of Supported Zn-Cu Bimetallic and Zn-Cu-Mo Trimetallic Heterogeneous Catalysts for dry reforming of CO₂ with Methane

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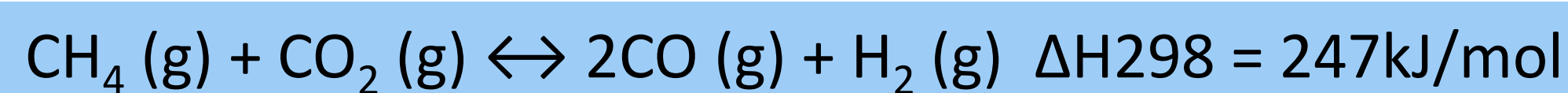
Objective

The primary objective of this study is to develop novel Zn based catalysts to enhance the reaction of CO₂ with CH₄.

Background

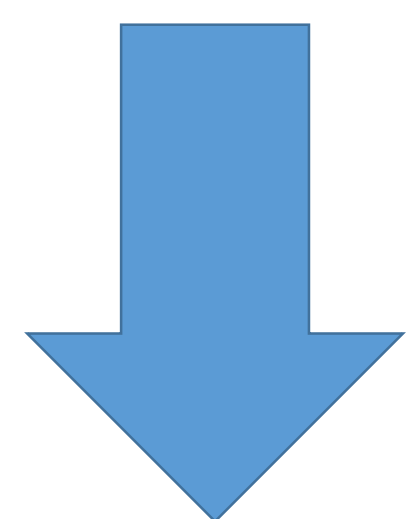
Global warming caused by greenhouse gas emission has been becoming more of an issue as the years progress.

Chemistry

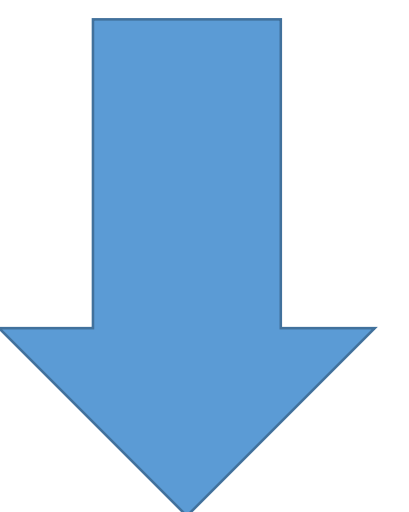


Experiment

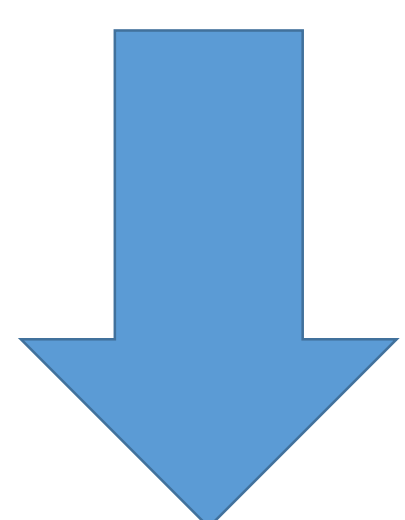
Support Pretreatment



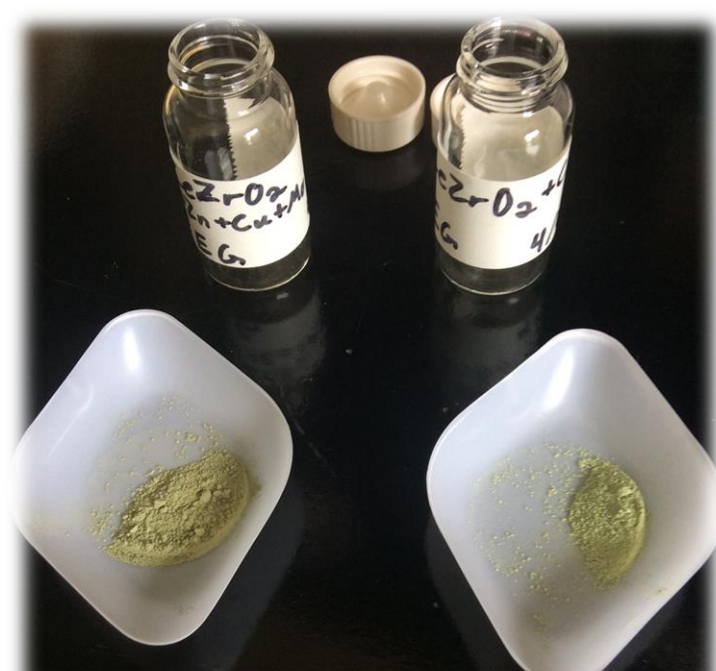
Wet Incipient Impregnation



Drying & Calcination



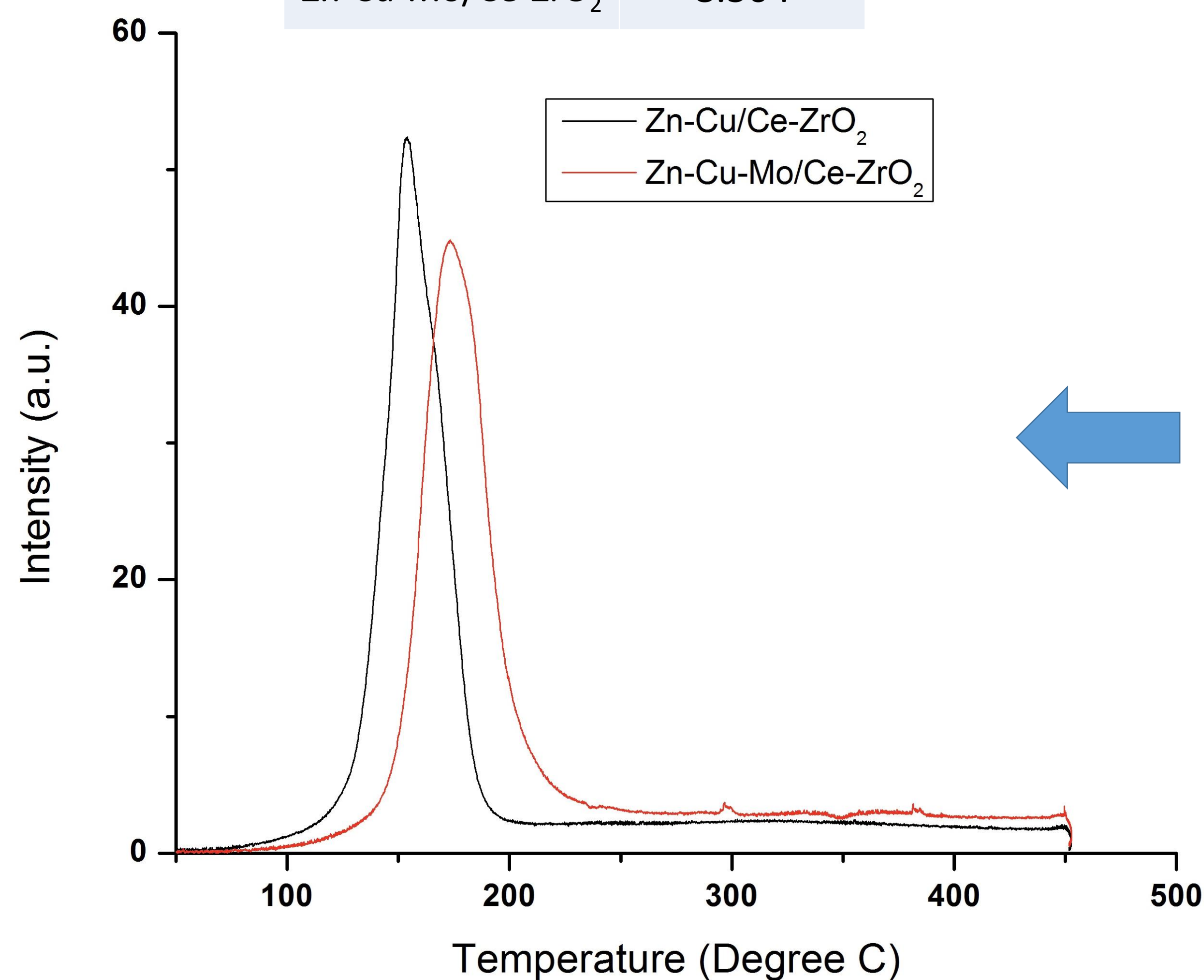
Finished Catalyst



Catalyst Characterization

CO Chemisorption to determine active sites on catalysts

Catalysts	CO Uptake Value (μmol/g)
Zn-Cu/Ce-ZrO ₂	20.171
Zn-Cu-Mo/Ce-ZrO ₂	8.504



Temperature-Programmed Reduction to determine the reducibility of active metals in supported catalysts and to exam the alloy formation of the bi- and tri-metallic catalysts.

Catalyst Testing



The flow-bed reactor with controlled CO₂ and CH₄ flow rate

Future Work

Test the performance of the catalyst using a flow bed reactor. Characterize the catalyst at Brookhaven national lab (BET) (TEM), (XPS), (XRD), CO Chemisorption and (TPR) Establishing the relationship of activity and property

Reference

M. Myint et al., Reforming and oxidative dehydrogenation of ethane with CO₂ as a soft oxidant over bimetallic catalysts, J.Catal. (2016), <http://dx.doi.org/10.1016/j.jcat.2016.02.004>