

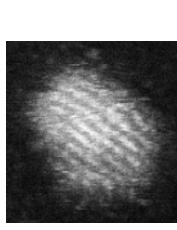
# NETL's in-house CO<sub>2</sub> utilization research

Research &  
Innovation Center

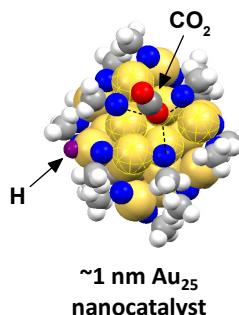


## "Carbon Neutral" Electrochemical CO<sub>2</sub> Conversion

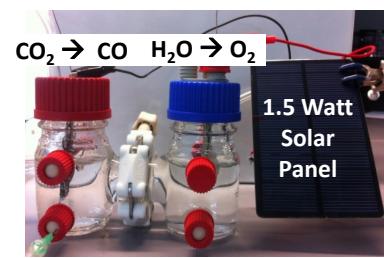
Advanced catalysts with record-setting reaction rates and  
renewably-powered reactor systems



~3 nm alloy  
nanocatalysts



~1 nm Au<sub>25</sub>  
nanocatalyst

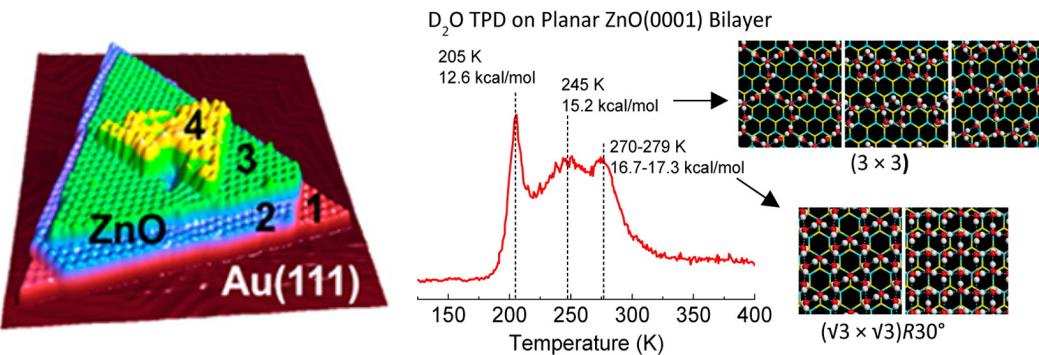


Bench-scale "Carbon Neutral" CO<sub>2</sub> reactor

D. Kauffman & D. Alfonso: J. Am. Chem. Soc., J. Phys. Chem. C, J Phys Chem. Lett. Chem. Sci.,  
ACS Catalysis & ACS Appl. Mater. Interfaces.

## "2D" Nanomaterials with Enhanced Reactivity

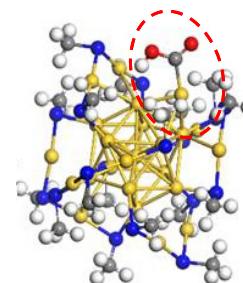
World-class synthetic and characterization techniques  
produce unique properties and chemical reactivity



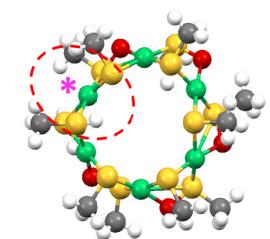
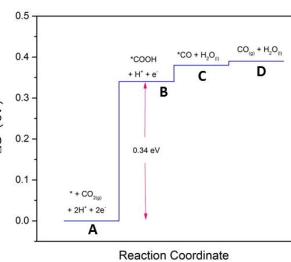
J. Lee & X. Deng: J. Am. Chem. Soc., J. Phys. Chem. Lett. & J. Phys. Chem. C

## "Computational Electrochemistry"

Cutting-edge computational techniques provide chemical details and  
screen new nanocatalyst systems



Au<sub>25</sub> Nanocatalyst

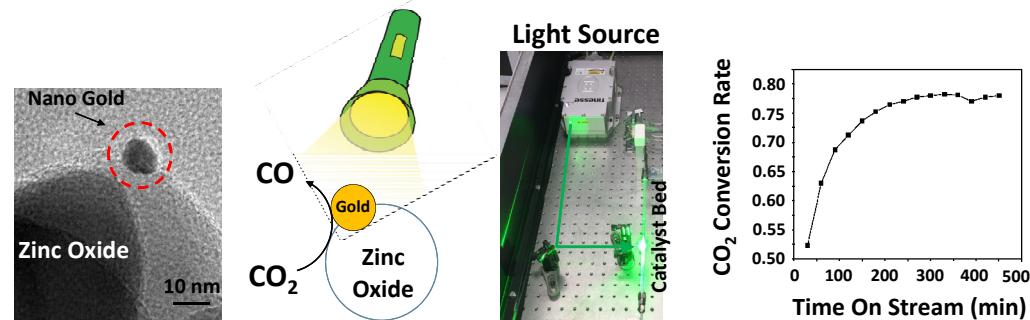


Ni<sub>6</sub> Nanocatalyst

D. Alfonso & D Kauffman: ACS Catalysis & J. Chem. Phys.

## Light-Based "Plasmonic Reactor"

World's first demonstration of this transformational technology!  
A zinc + gold nanocatalyst uses light to convert CO<sub>2</sub>



S. Hammache & C. Matranga