Recent Electrocatalyst Work at NETL

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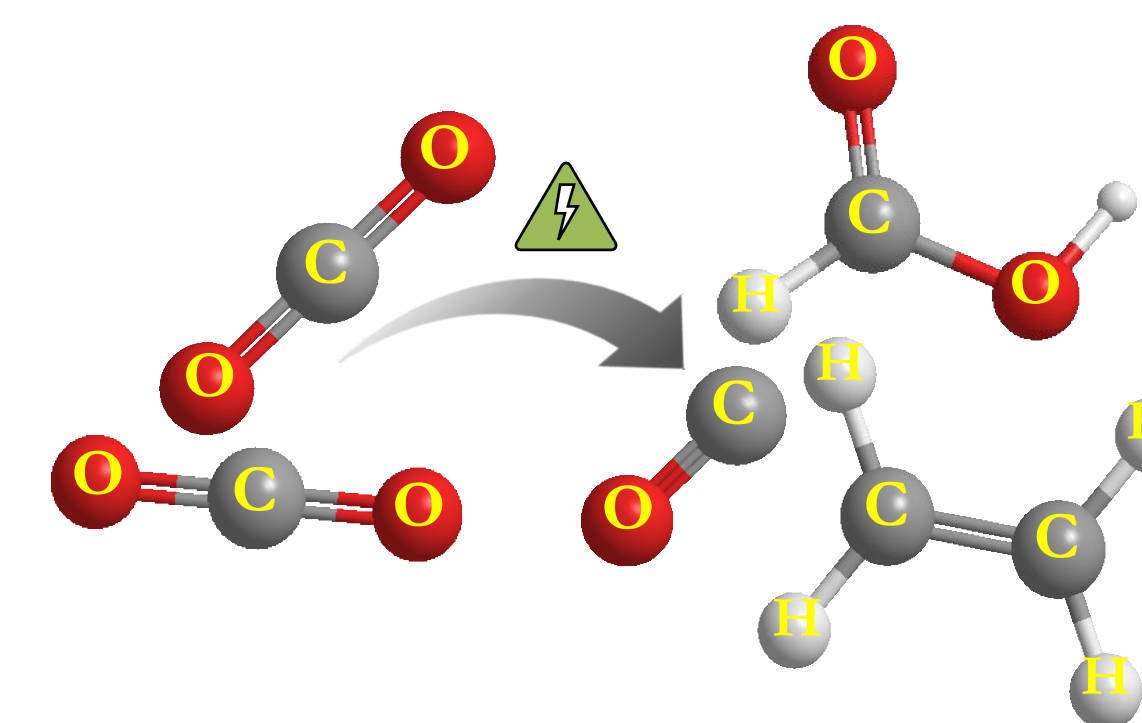
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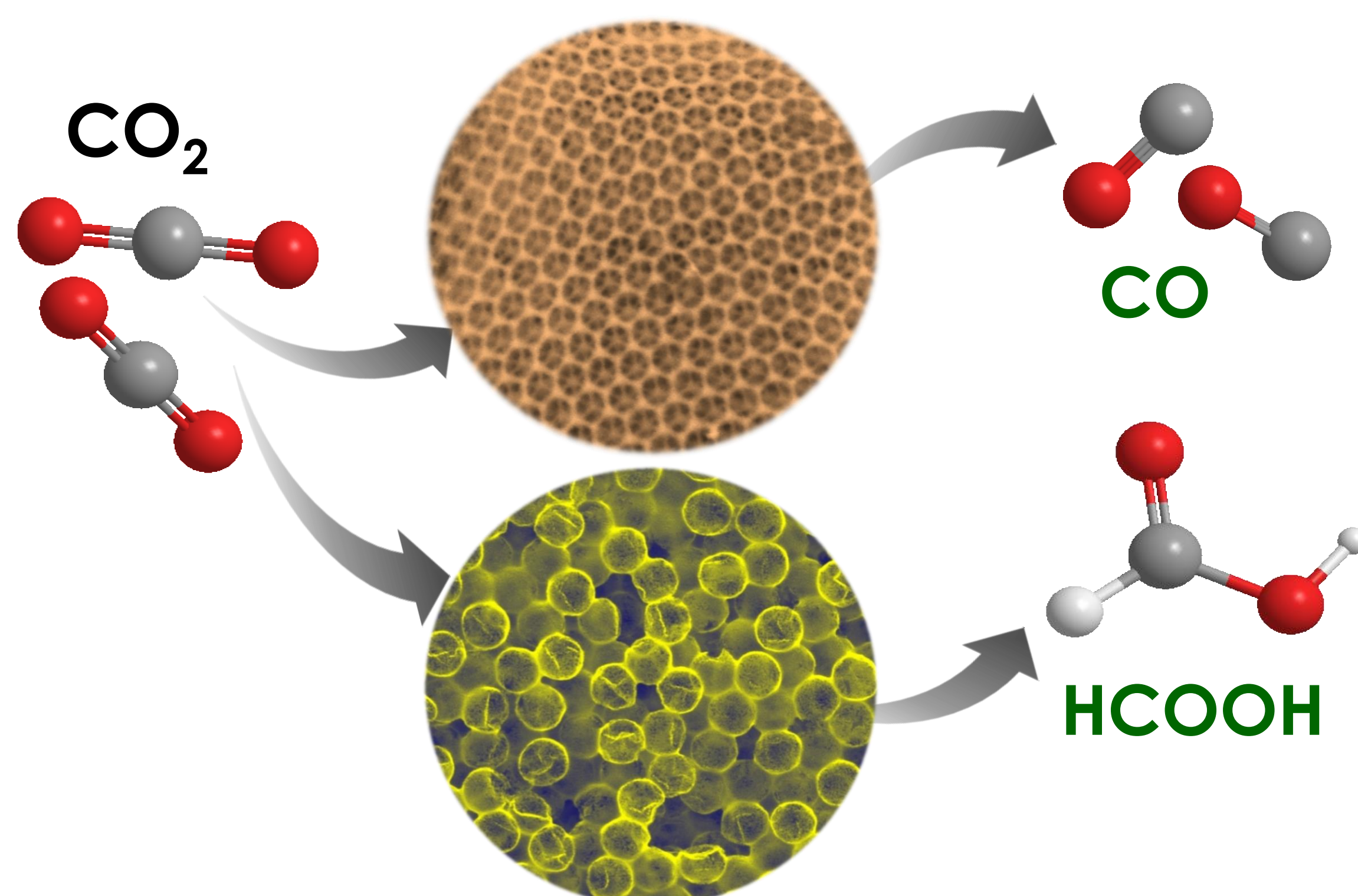
Electrocatalyst Design

- **10 years of early-stage research**
- **Establish structure-property relationships and develop high activity catalysts**

Converting waste CO_2 into value-added chemicals and fuels

Controlling catalyst morphology and composition to reduce or eliminate precious metals

Structure-Enhanced Catalysis
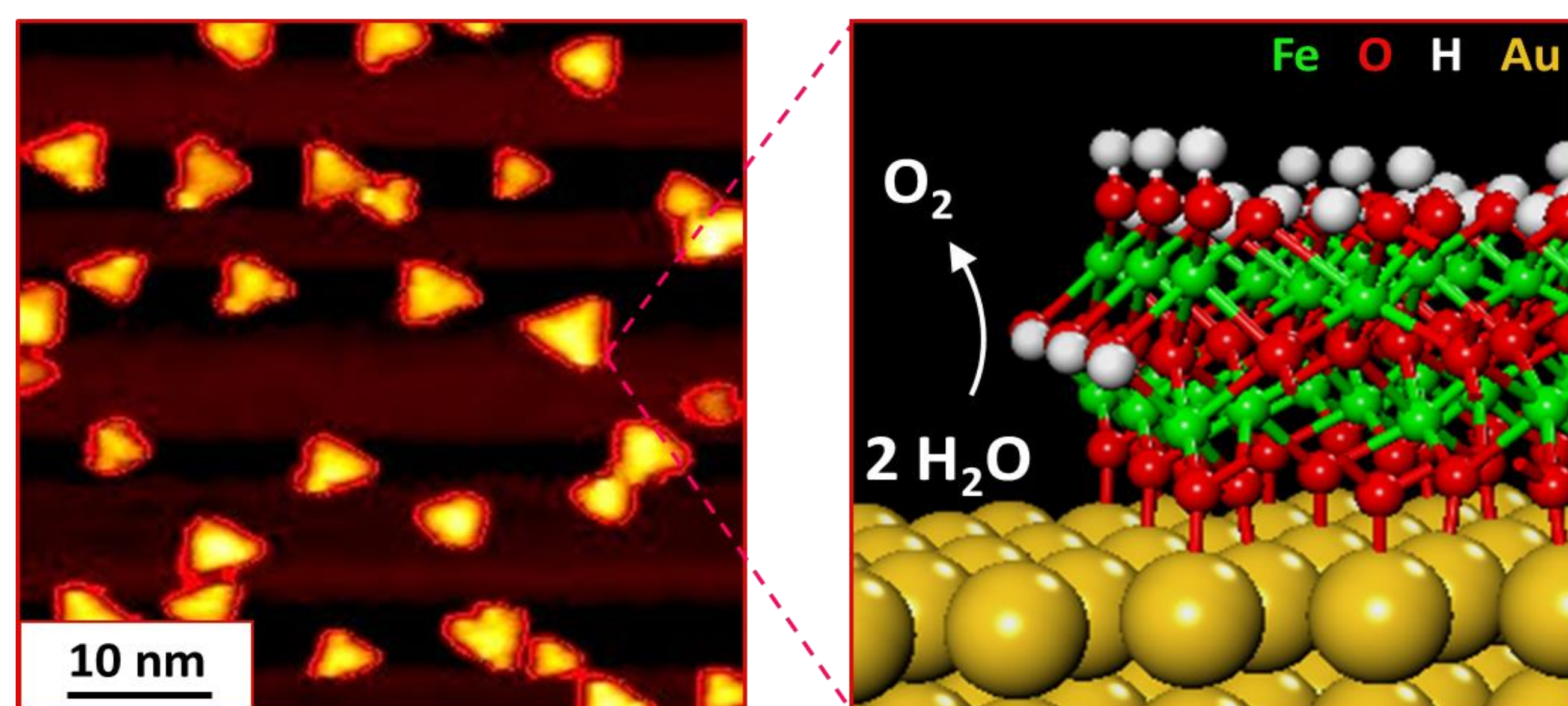
CO_2

CO

HCOOH

Using 3D morphology to tune selectivity and boost activity

- ~90% selective CO production with >72% Faradaic efficiency from CuO inverse opal catalysts

- 6-fold activity enhancement from SnO_2 nanospheres and stable long-term performance over several days

J. Mater. Chem. A 2019, 7, 27576

Surface-Science Enabled Electrocatalysis

Fe O H Au

O_2

$2 H_2O$

10 nm

Precisely identify and quantify important reaction centers

ACS Catal. 2019, 9, 5375

Atomically-Precise Nanocatalysts

THE JOURNAL OF PHYSICAL CHEMISTRY C

ACS Publications

Unique structures reduce or eliminate need for precious metals

ACS Catal. 2016, 6, 1225   *J. Phys. Chem. C 2018, 122, 27991*

Acknowledgement

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