Creation of porous materials through phase segregation for catalytic applications.

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Porous Materials in Catalysis

Fuel Cells:

$H_2 + O^{2-} \rightarrow H_2O + 2e^-$

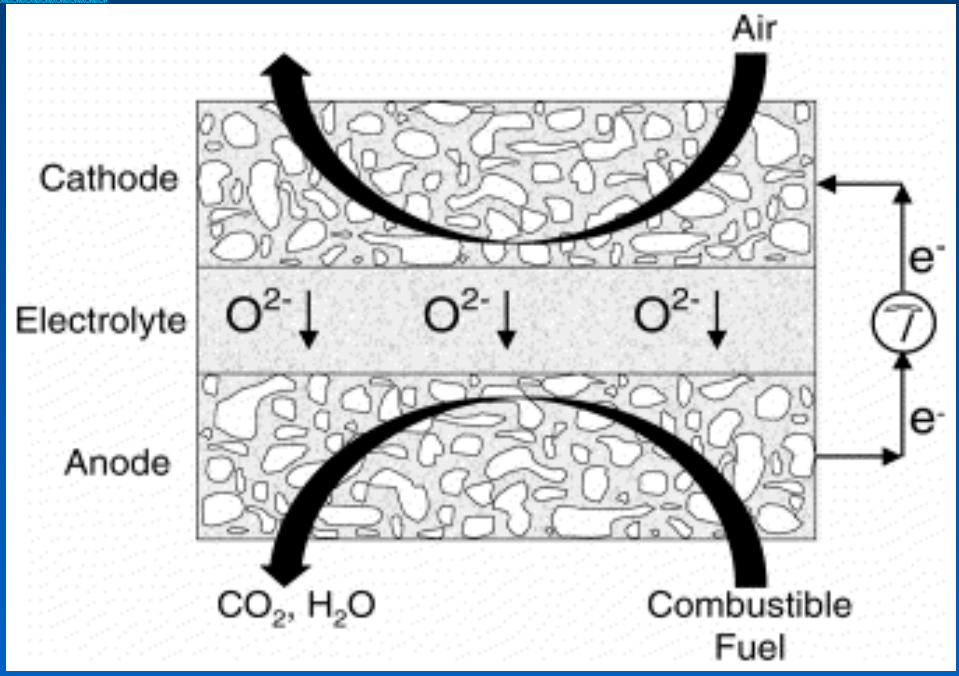
porous catalytic electrodes

Concerns:

economics

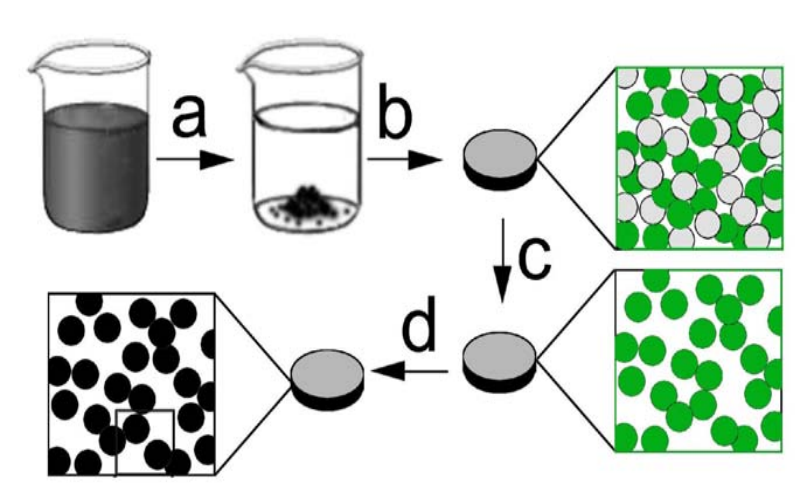
morphology

surface area vs flow rates



Investigating new method that addresses these concerns

Porous Materials via Phase Segregation



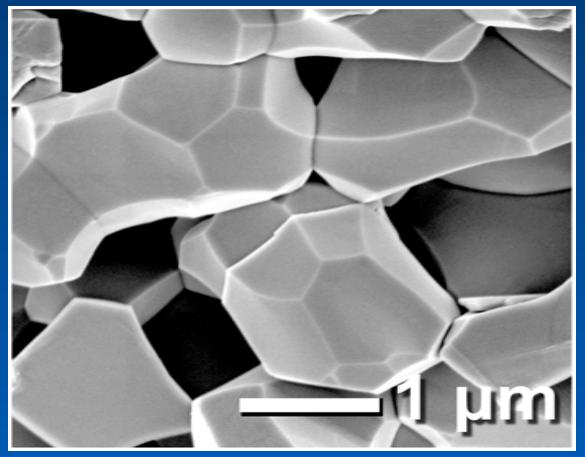
a- form metal-organics

b- burn off organic to form metal oxides

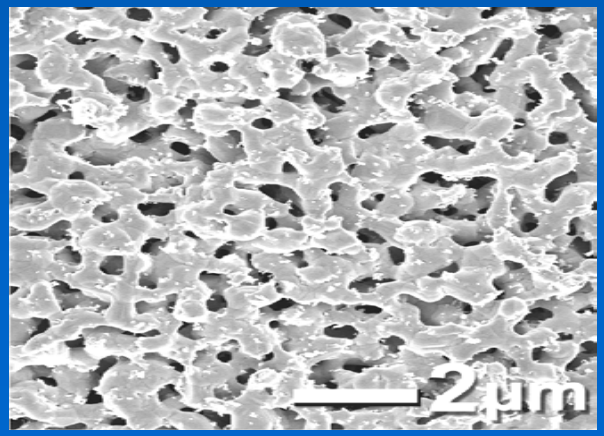
c- leach out one metal oxide phase

d- reduce remaining metal oxide to metal

C – porous metal oxide



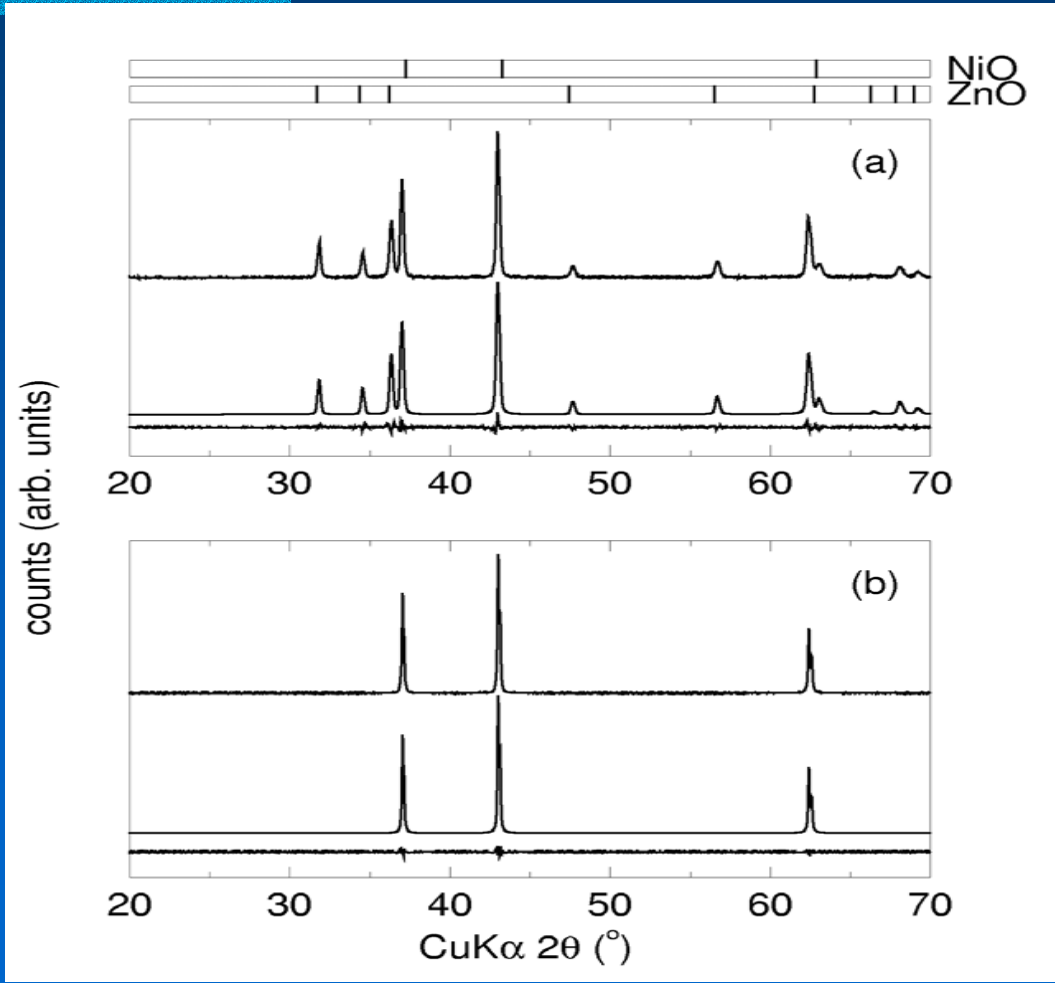
D – porous metal



X-Ray Diffraction Analysis.

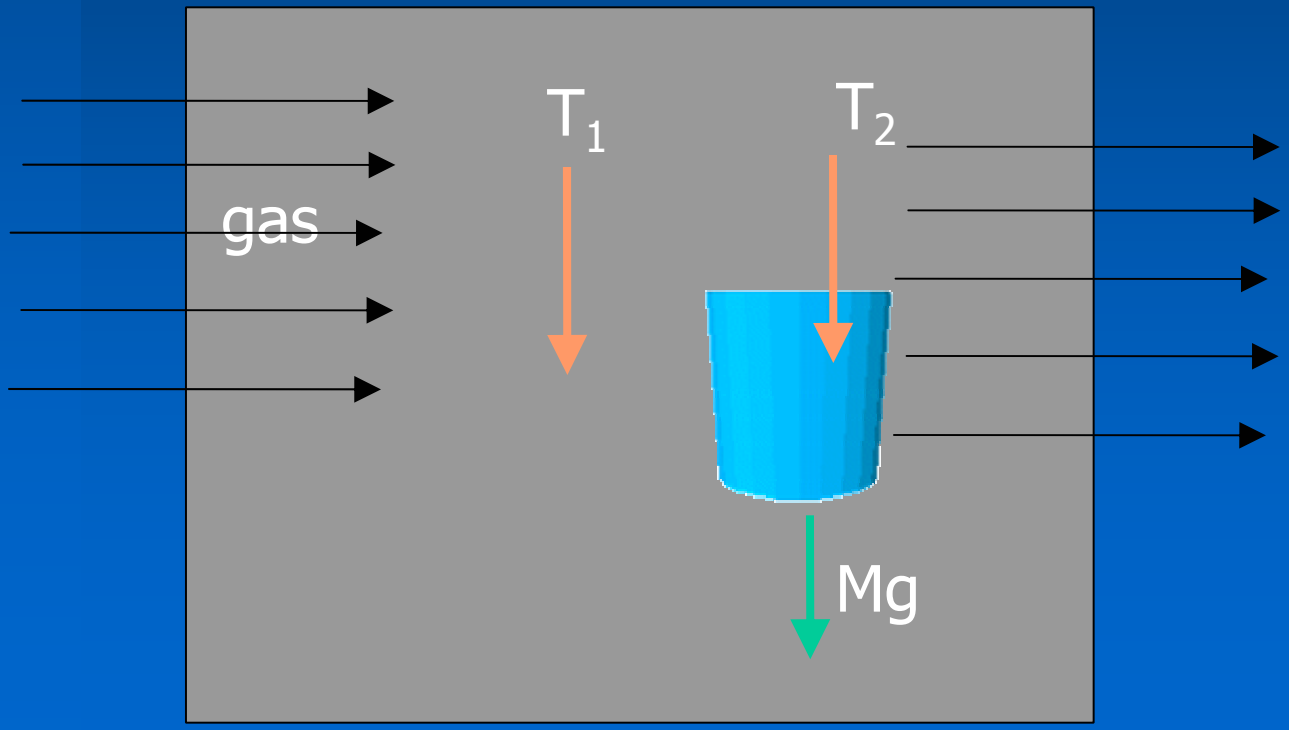
Identification of NiO & ZnO post-decomposition

Quantitative analysis on X-Ray data revealed % of Zn doping on NiO.



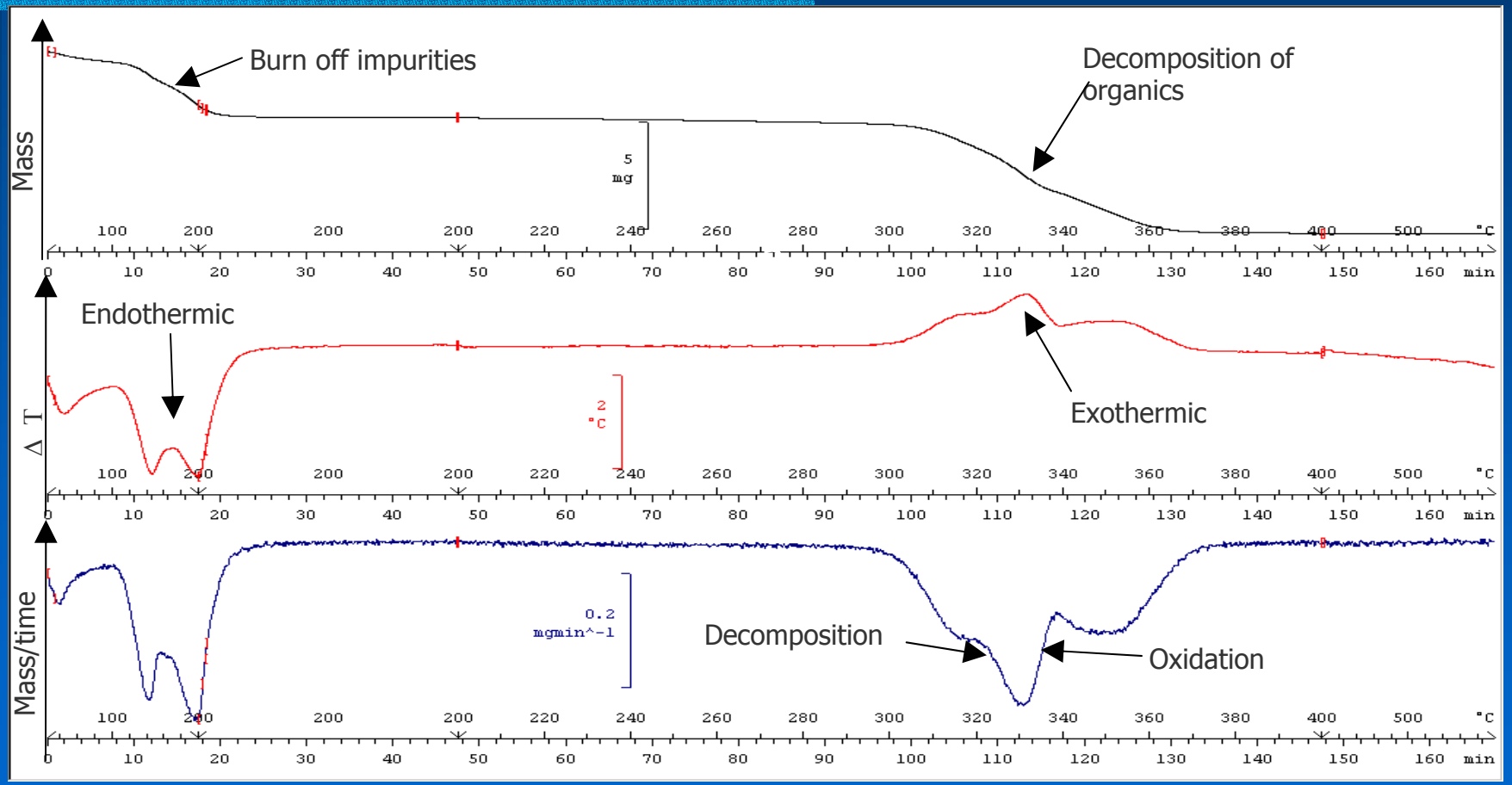
Thermo-Gravimetric Analysis

Simply measures weight per temperature.



Thermo-Gravimetric Analysis Data

Metal organics ⟶ Metal oxides $\Delta T = T_2 - T_1$



Conclusions

Successfully synthesized porous Nickel.

- **Various pore sizes.**
- **Effect of pressure on porosity.**

Study of NiO/ZnO system.

- **Doping of Zn on NiO.**

Application of synthesis techniques to other systems.

- **$ZnFe_2O_4 \longrightarrow$ porous Fe**

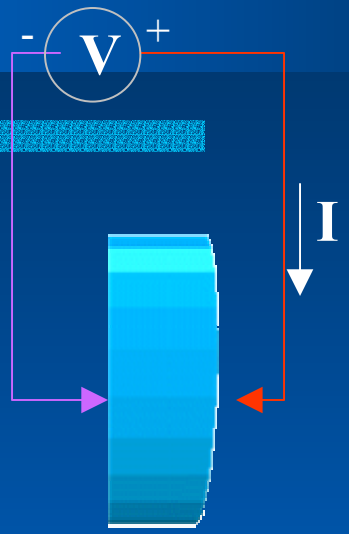
(Near) Future Plans.

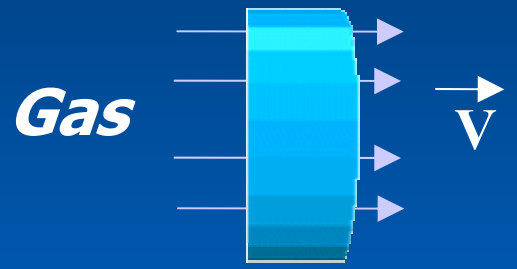
Electrical conductivity tests.

Gas Flow Rate measurements.

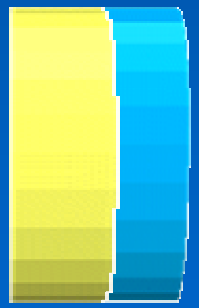
Create materials with porosity gradient.

Construct Solid-Oxide Fuel Cell





High pore size



Low pore size