Parallel Plasmonics and Raman In-Situ Study of Au Nanoparticle: Metal Oxide Interfacial Catalytic Reactions

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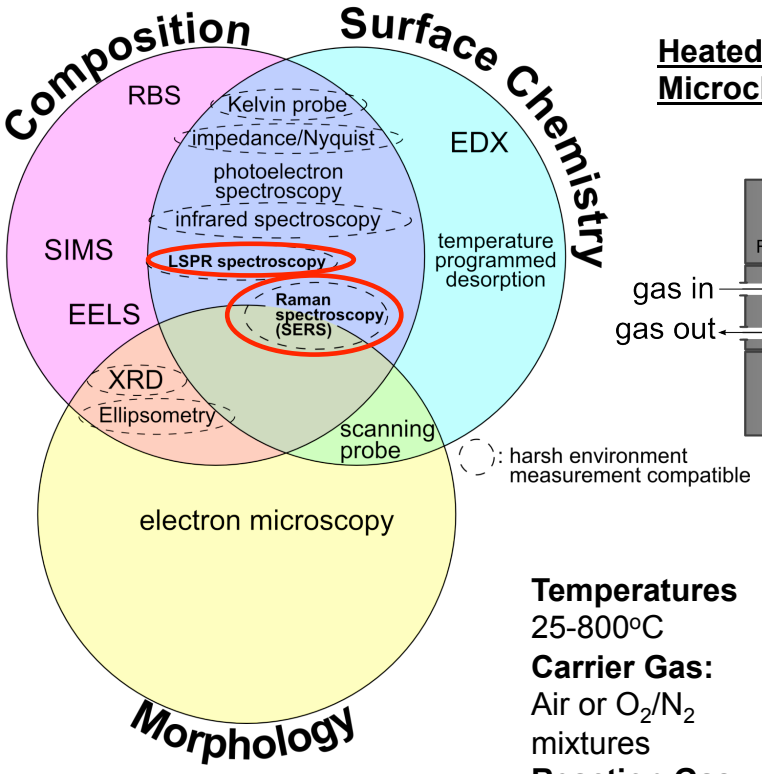
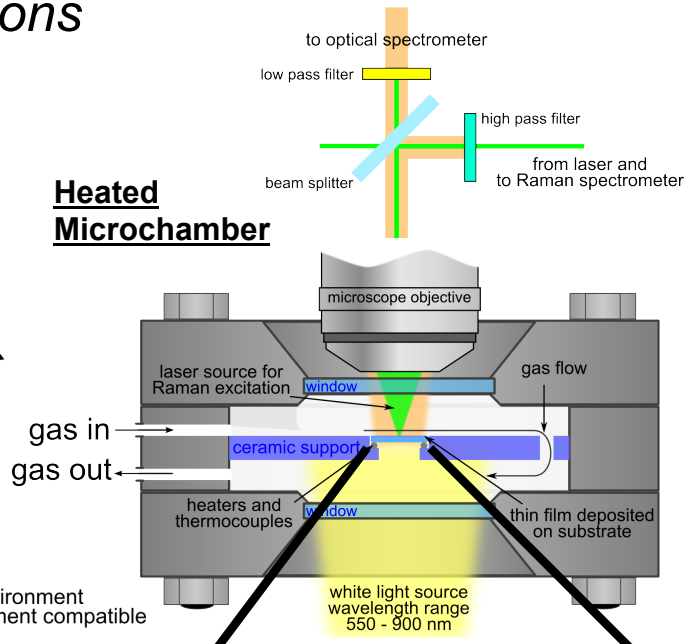
Research Program:

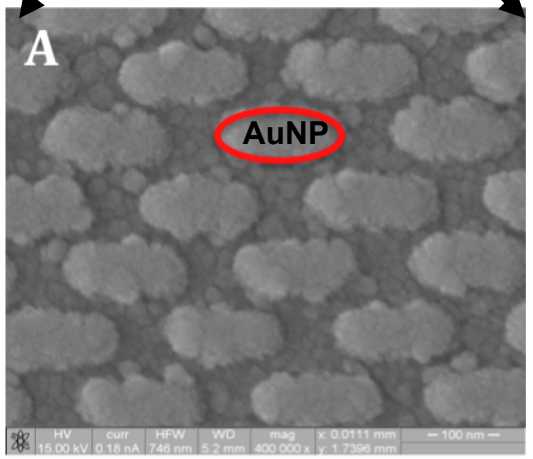
- Plasmonic and Raman properties of Au nanoparticles embedded in metal oxides are dependent on the nanocomposite's properties
- Correlate surface chemistry, compositional and morphological effects with in-situ plasmonic and Raman spectra
- Study Ebeam patterned Au nanoparticles coated with metal oxides (YSZ, TiO_2, and CeO_2 (doped with Gd or Sm dopants)
- Determine Interfacial reaction dependencies upon exposure to CO, H_2, NO_2 in oxygen containing atmospheres



Heated Microchamber



Temperatures
25-800°C
Carrier Gas:
Air or O_2/N_2 mixtures
Reaction Gas:
CO, H_2, or NO_2



E-beam patterned gold nanorods
- 10nm YSZ overcoating
- Annealed to 800°C

Education:

- Graduate students, summer interns
- Outreach to high school students

Facilities:

- E-beam lithography
- XRD, XPS, SEM, ESEM, TEM, and RBS and will be used to determine the microstructure and composition of these films
- Renishaw and Ocean Optics systems for in-situ Raman and LSPR spectral analysis
- Heated microchamber, < 800°C, for in-situ analysis of gas exposure experiments

Collaborations:

- Andrei Kolmakov – Southern Illinois University at Carbondale
- Thevuthasan, Suntharampillai – Pacific Northwest National Laboratory

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