

# OGURA LAB.

## [Molecule-sized Nano Space and Catalysis]

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### Nano Space and Catalysis

Our research group tackles on the environmental, and resources and energy problems using nano porous materials.

Nano-sized space allows us to...

e.g.,)

- Store and concentrate materials and energy
- Capture harmful chemicals
- Select or sieve molecules by their size and chemical properties
- Anchor the catalytic site in the nano space
- Catalyze space-selective reactions

Unique Adsorbent

Unique Catalyst

➔ Create The Truly Useful Catalysts via A Design of Nano Space Reaction

### Approaches in Ogura Lab

#### Environment

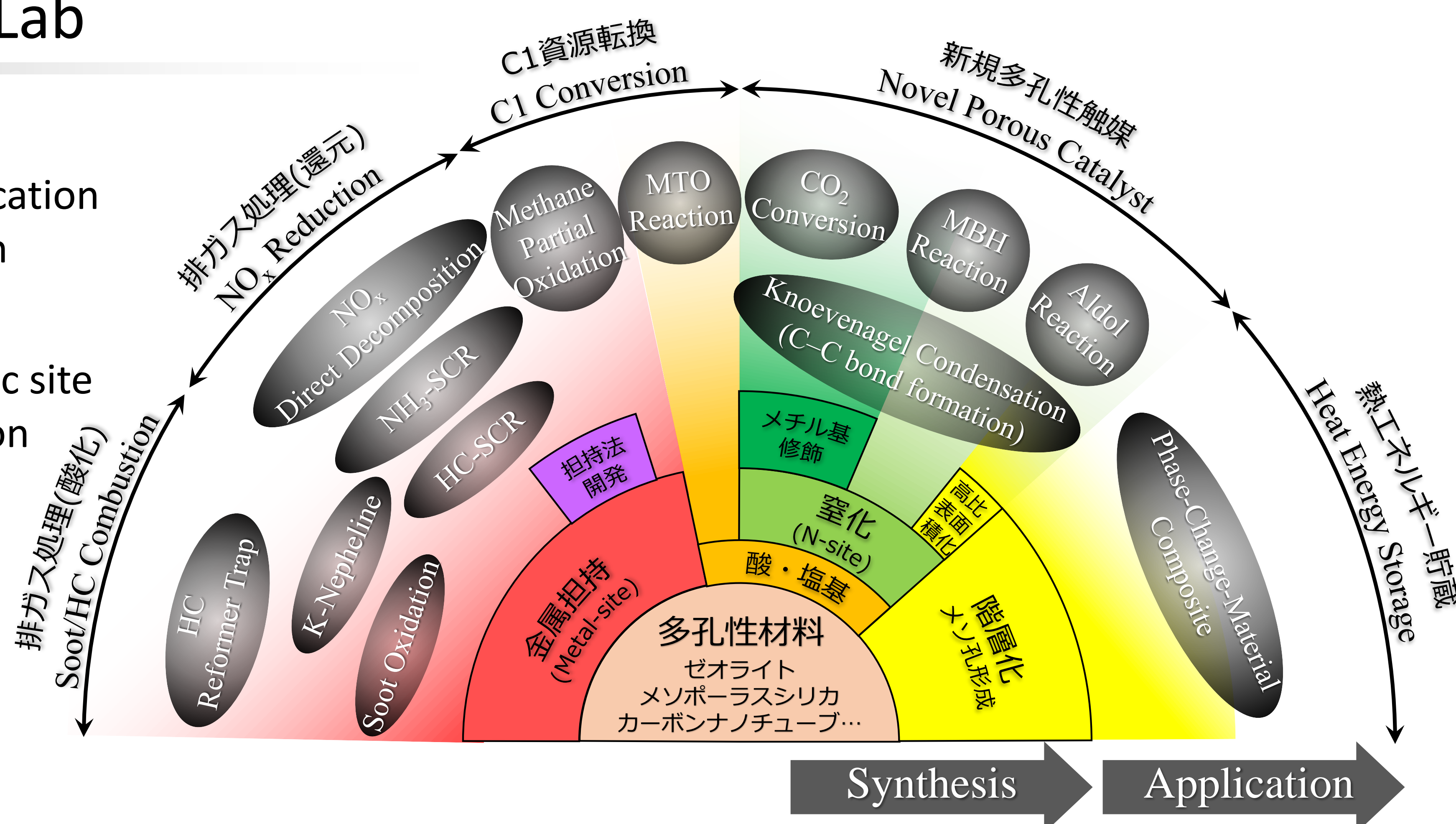
- Catalysis for exhaust gas purification
- Exhaust gas purification system

#### Resources

- Novel porous catalyst / catalytic site
- Catalysis for C1 / CO<sub>2</sub> conversion
- C-C bond formation reaction

#### Energy

- Thermal energy storage
- Heat release-store process



### Partial Oxidation of Methane

### Thermal Energy Recovery

#### Issues for the dream reaction

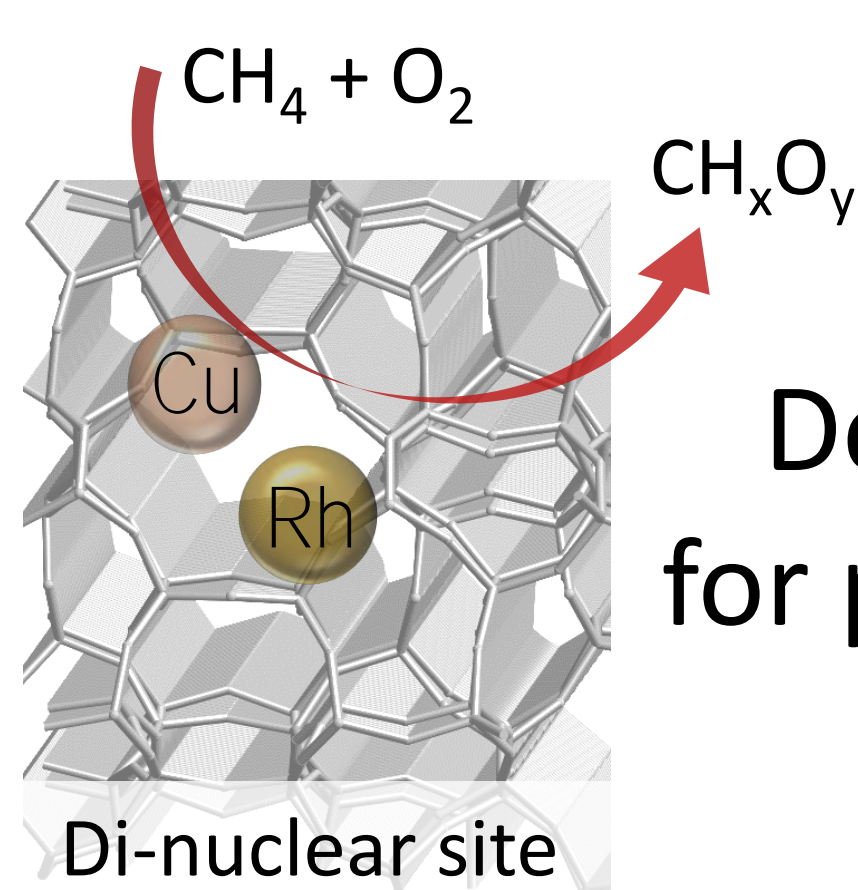
- Suppress total oxidation
- Activate stable C-H bond
- Achieve high yield

Concerted di-nuclear metal site

C-H activation (Rh, Ir, Pd, ...)

Active oxygen formation (Fe, Cu)

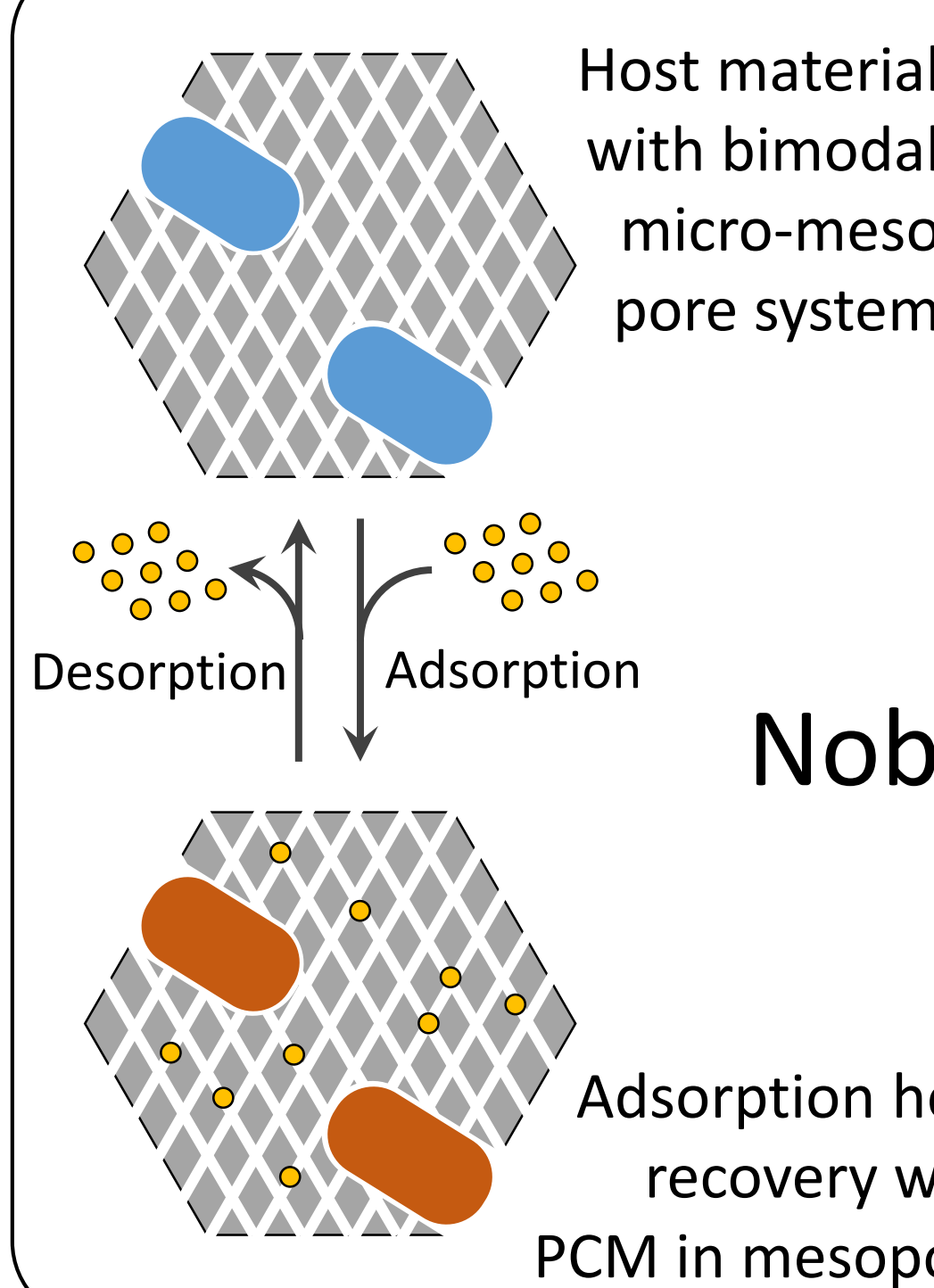
Create catalytic sites possessing different roles inside nano-space



Design of noble metal catalyst for partial oxidation of methane

Catalytically synthesize useful oxygenates

M2 Naoto



- Thermal control of sorption system
- Use of latent heat of PCM material

Design of nanocomposite with minimum heat transfer distance

Noble PCM inserted adsorbent

Novel composite of porous material and heat storage material

M2 Tomohiro