Exp.

OGURA LAB.

[Molecule-sized Nano Space and Catalysis]

Institute of Industrial Science, Department of Materials and Environmental Science

Department of Chemical System Engineering,
Department of Applied Chemistry

http://www.ogulab.iis.u-tokyo.ac.jp

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...

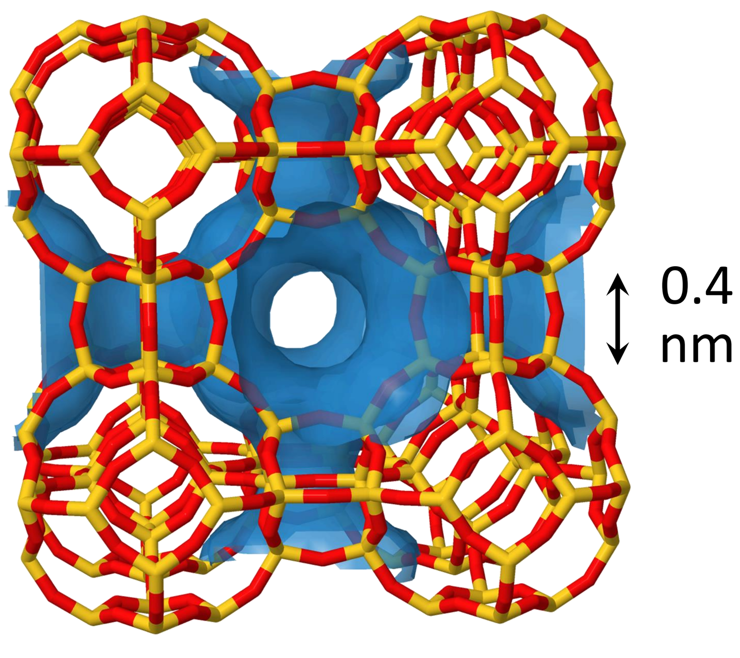
e.g.,)

- 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 catalysts

Porous Materials

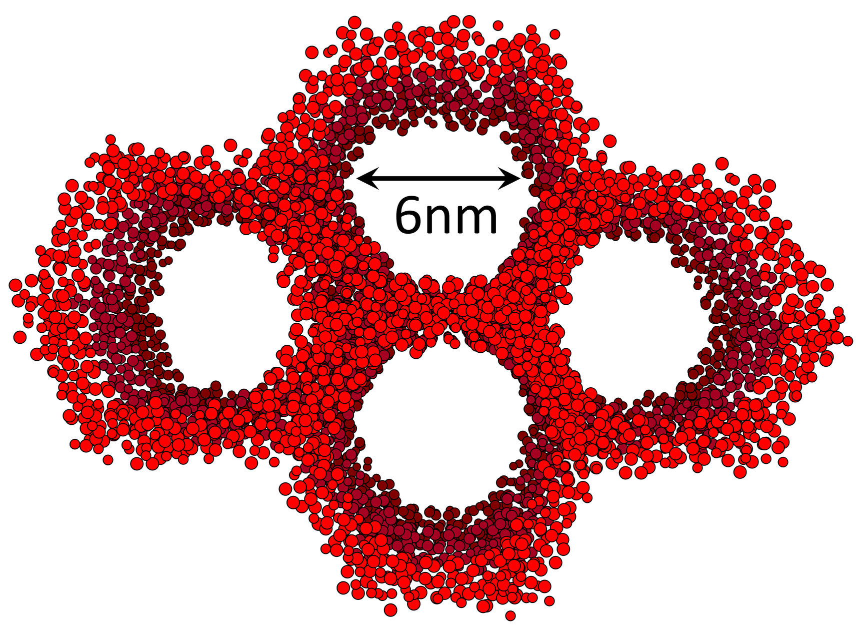
Zeolite



Structure Commission of the International Zeolite Association

Crystalline nano-structure

Mesoporous Silica



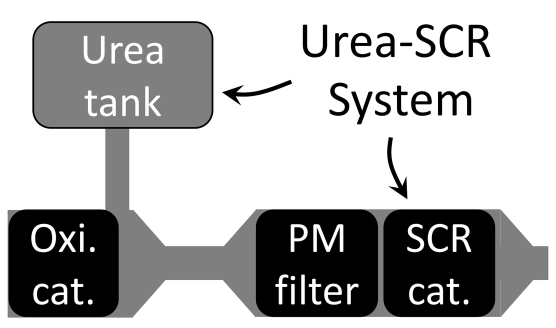
Ordered meso-structure

Create The Truly Useful Catalysts via a Design of Nano Space Reaction

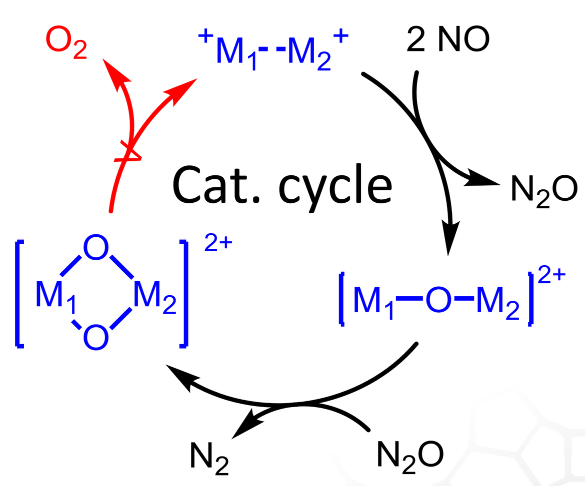
Synthesis

Application

Environmental Catalysts



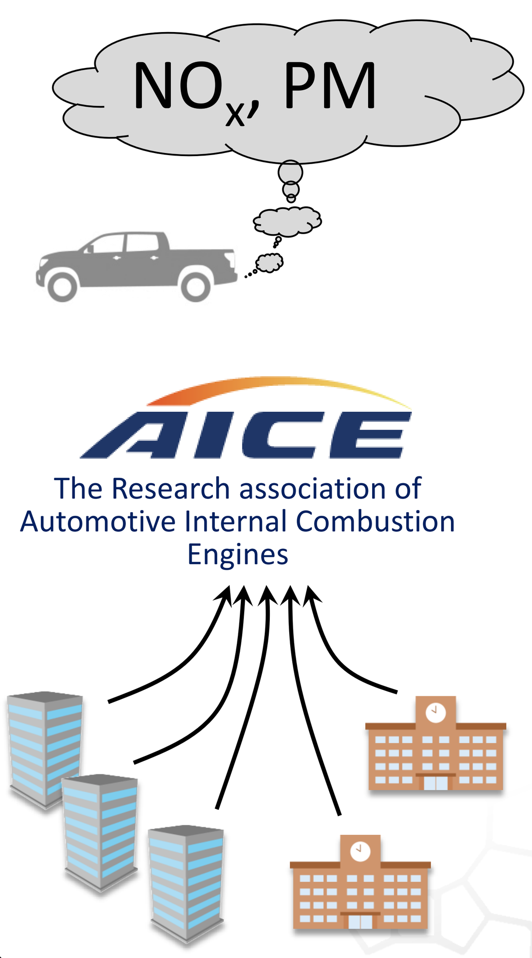
- Rare-metal-free cat. for NO removal
- Compact system for vehicle installation
  → Alternative catalytic system instead of Urea-SCR (Cu-CHA)



Designed Multi-nuclei Catalyst for NO Direct Decomposition

Create an appropriate di-metal site through both computational and experimental approaches

M2 Yusuke



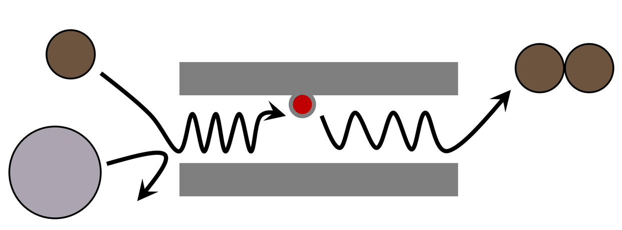
- Common technical problems
- Severe requirements from a society in performance and exhaust restriction
  → All-Japan OEMs work together to improve the engine efficiency and decrease pollutant emissions

Joint Research for $DeNO_x$ Cat. Development

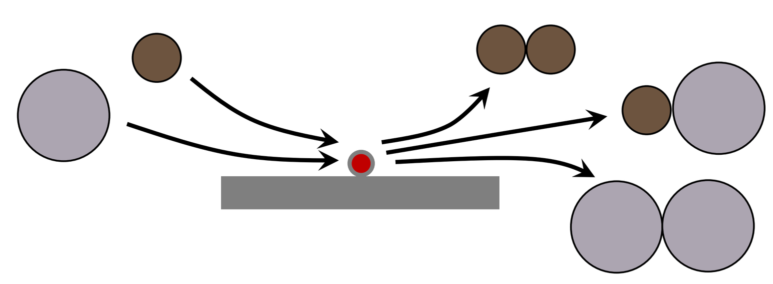
Collaborate with automobile companies and academic labs

AICE Team (Shimada, Ohnishi)

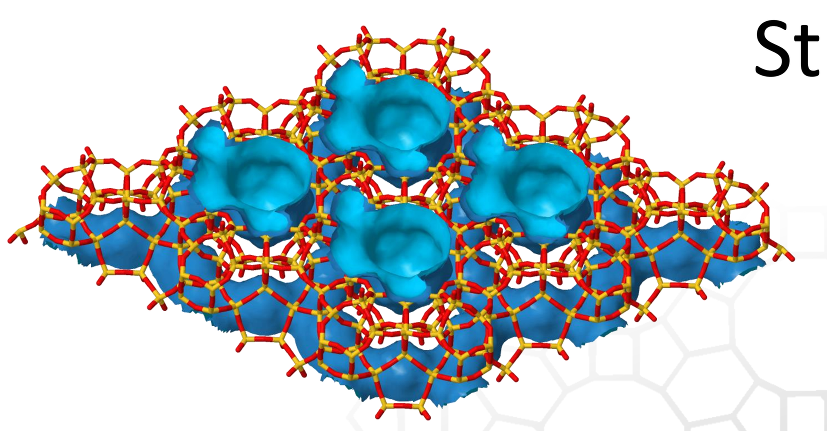
Reaction Space



Reaction in a pore
- Limitation in diffusion and reactant size



Reaction on a surface
- High diffusivity/accessibility
- Lose of structural selectivity?

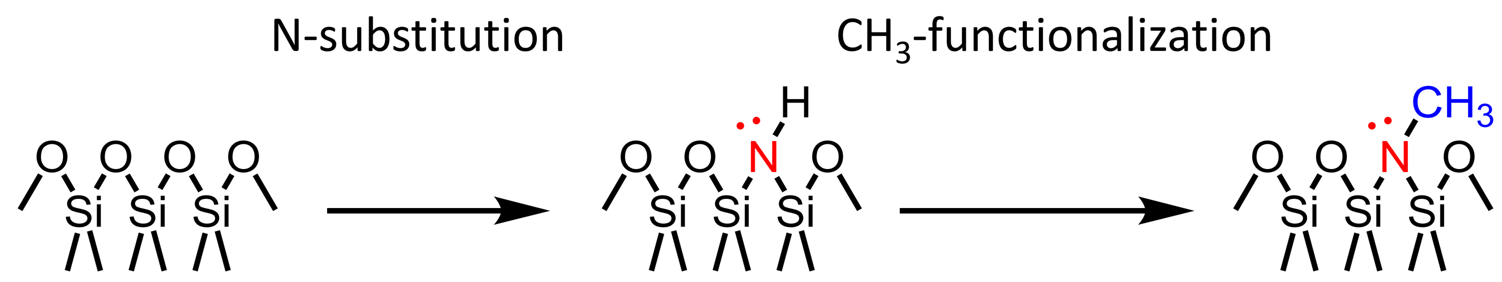


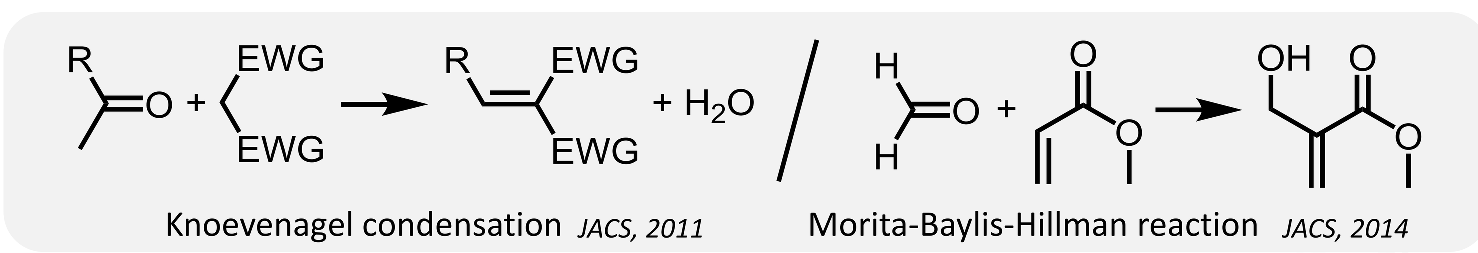
Structure Commission of the International Zeolite Association

Structured Surface for Unique Reactions

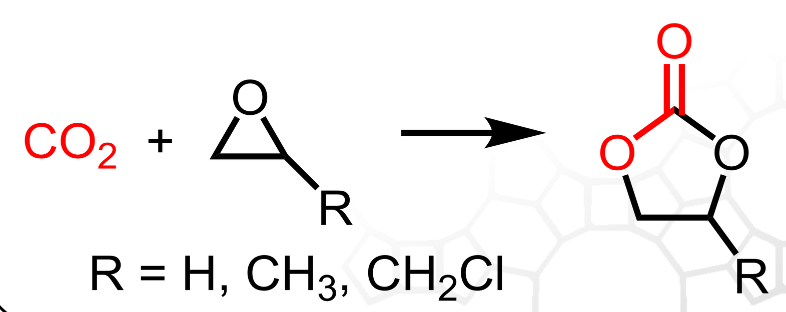
Perform a reaction over an surface pocket-structure

M2 Aisa





Catalytic Reaction for CO_2 Recycling



Catalyze a cyclic carbonate formation reaction with our original catalysts

D1 Kiyoyuki