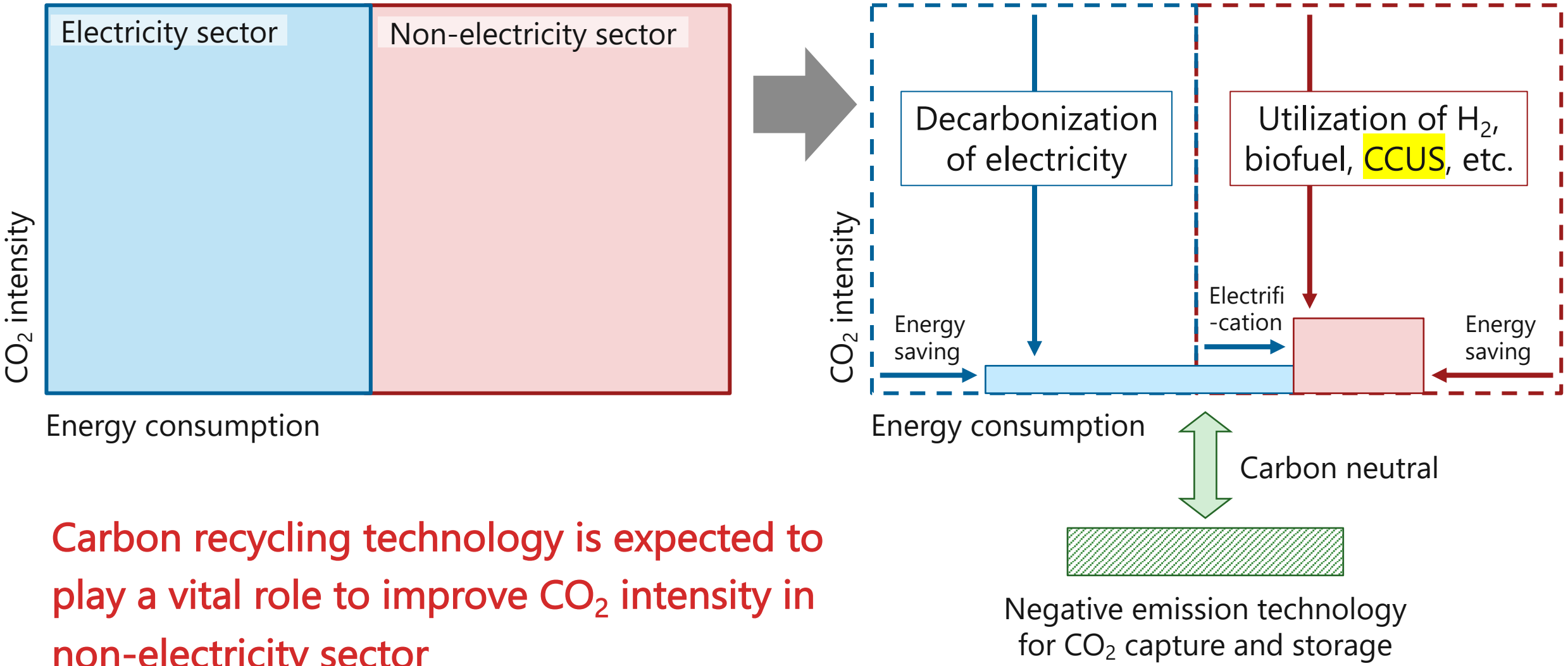
Carbon recycling technologies in AIST

Dr. OBARA Haruhiko

Executive Officer

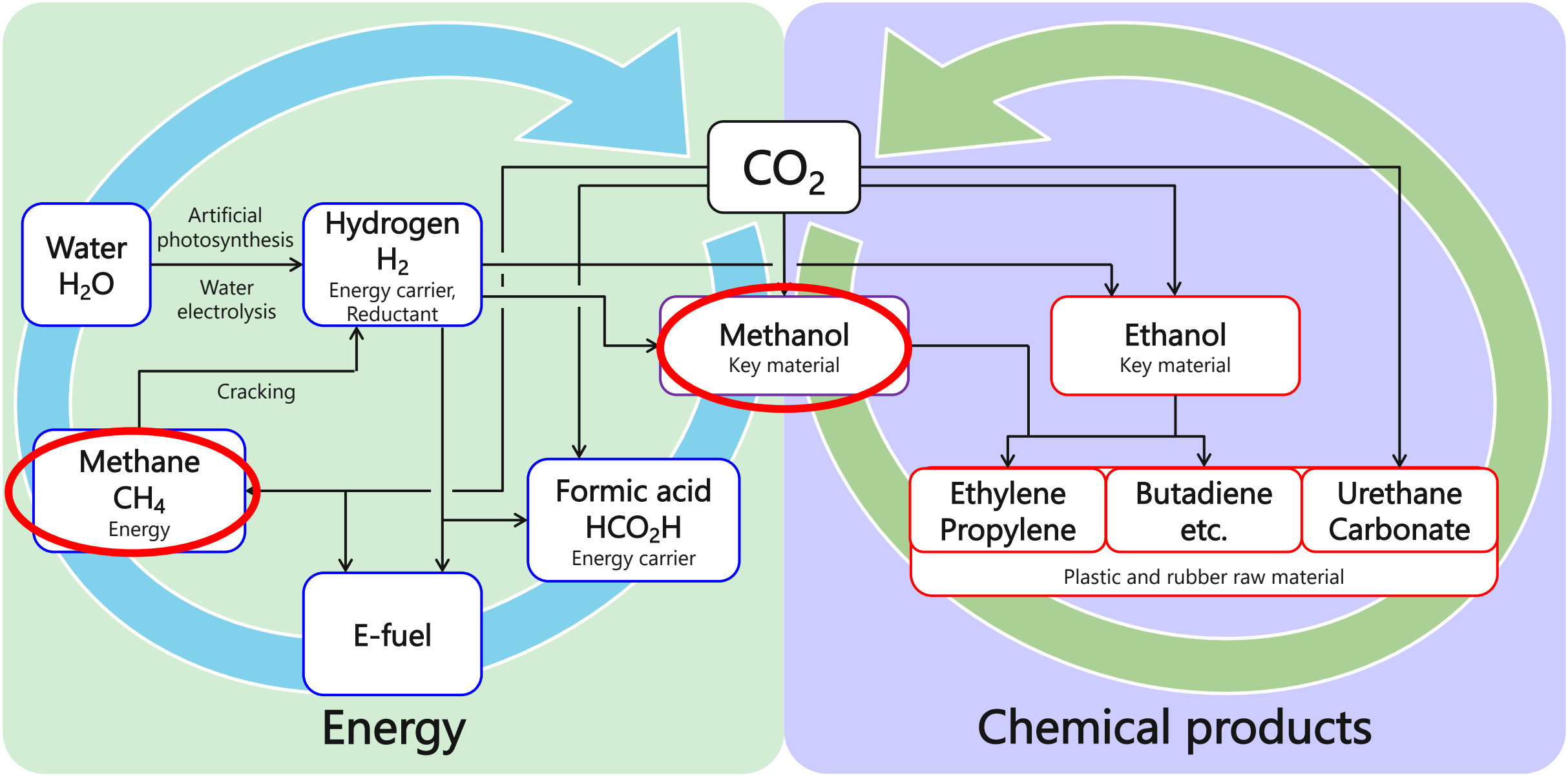
National Institute of Advanced Industrial Science and Technology (AIST)

Measures to achieve carbon neutrality



Carbon recycling technology is expected to play a vital role to improve CO_2 intensity in non-electricity sector

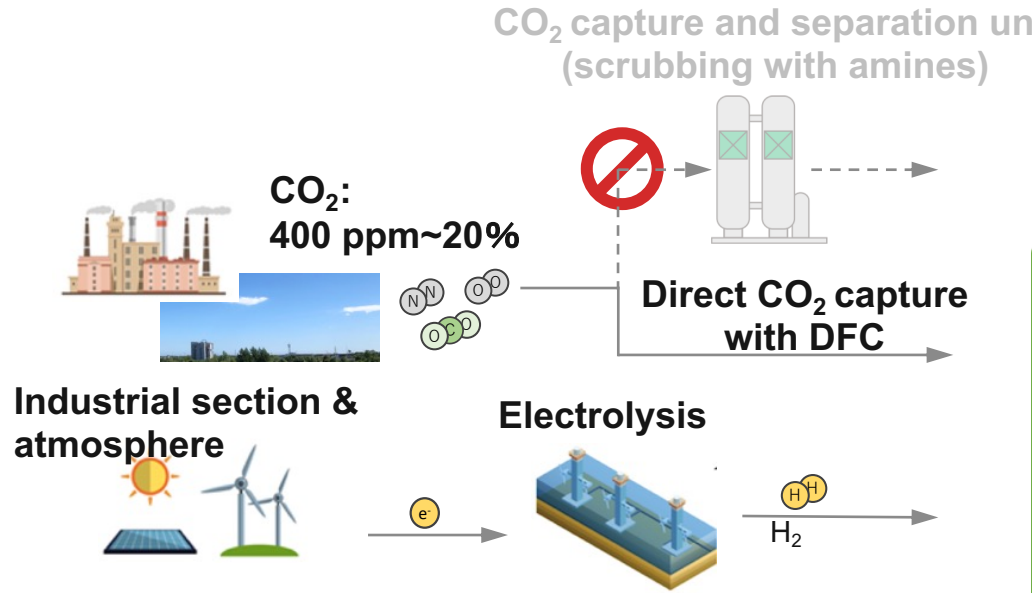
Outline of carbon recycling technologies in AIST

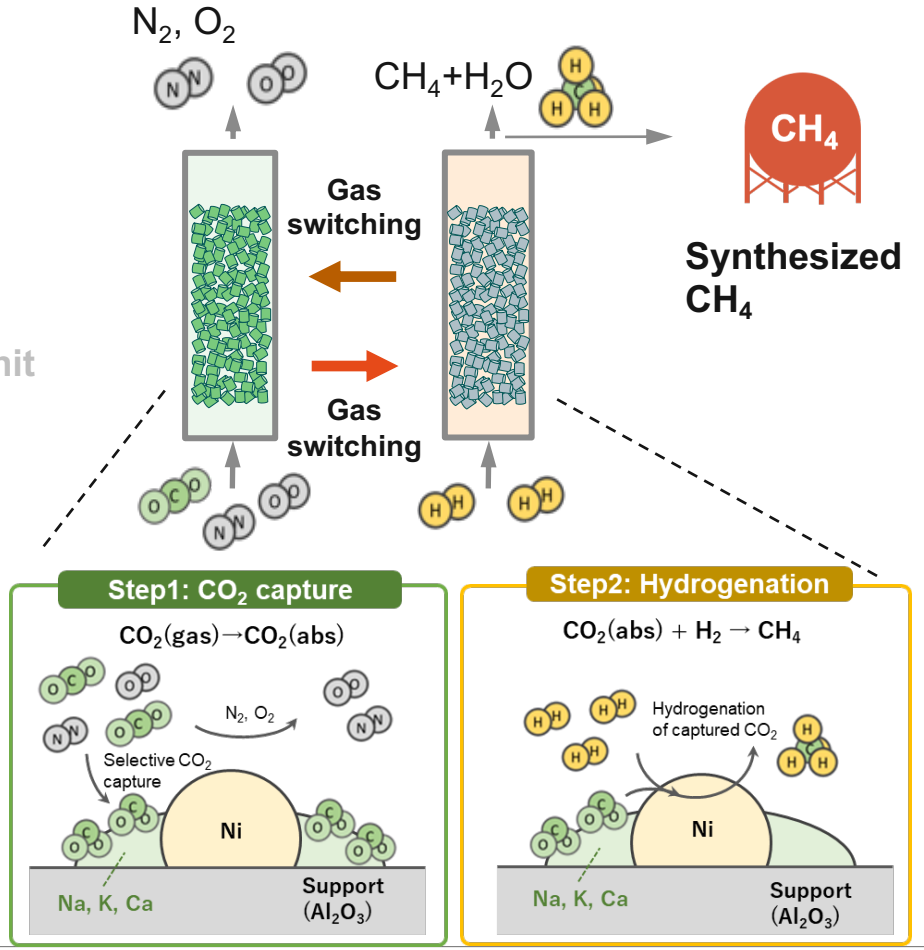


Direct CO_2 capture and methanation with double function catalyst (DFC)

A novel CCU technology

- Direct CO_2 capture by DFC itself and CH_4 production by gas switching
- Applicable to wide CO_2 concentration range (from 400ppm to percent order)
- Combination of exothermic reactions
  → No heat input required





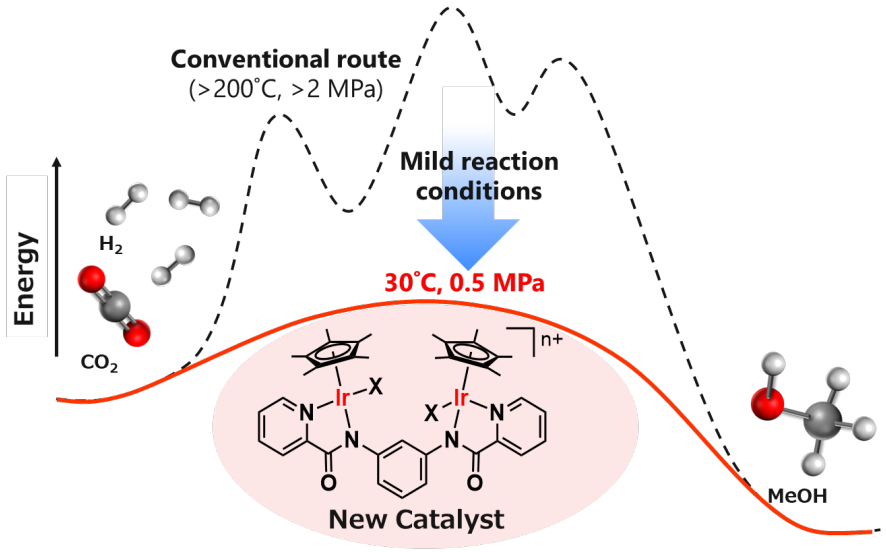
Catalytic hydrogenation of CO_2 to methanol at low temperature

Methanol (MeOH) production from CO_2 requires harsh reaction conditions (>200˚C, >2MPa) with conventional Cu-based catalysts

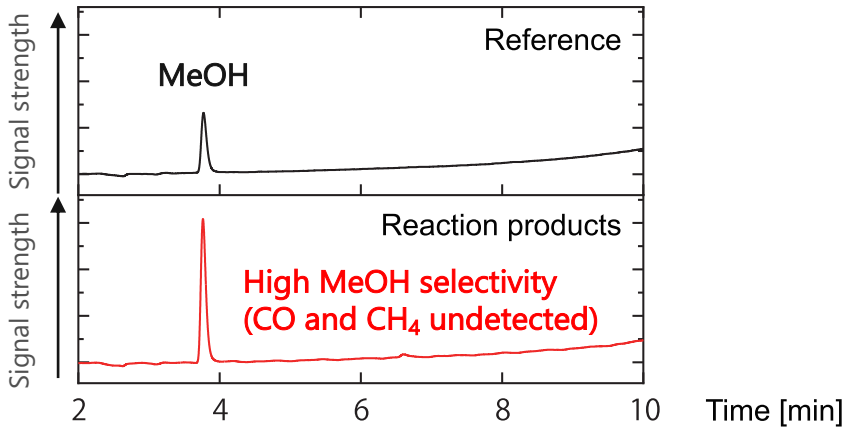
Development of dinuclear catalyst enabling MeOH synthesis in gas-solid phase reaction

- under mild reaction conditions (30˚C or 0.5MPa)
- with high MeOH selectivity

This catalytic system opens the door to new possibilities for the practical production of MeOH from CO_2 and H_2 at low temperature



Proposed energy profiles for MeOH production from CO_2 and H_2 by new catalyst vs conventional catalyst



Analysis of reaction products by gas chromatography