Conversion of CO_2 to useful substances with composite iron, nickel, and copper catalysts

Takashi SAGAWA
Graduate School of Energy Science,
Kyoto University, Kyoto 606-8501, Japan
E-mail: sagawa@energy.kyoto-u.ac.jp

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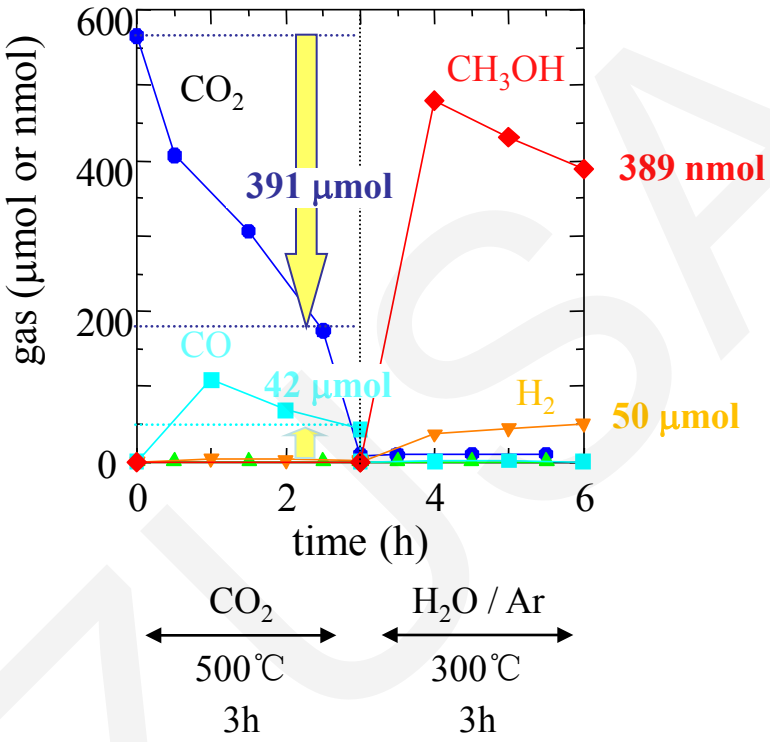
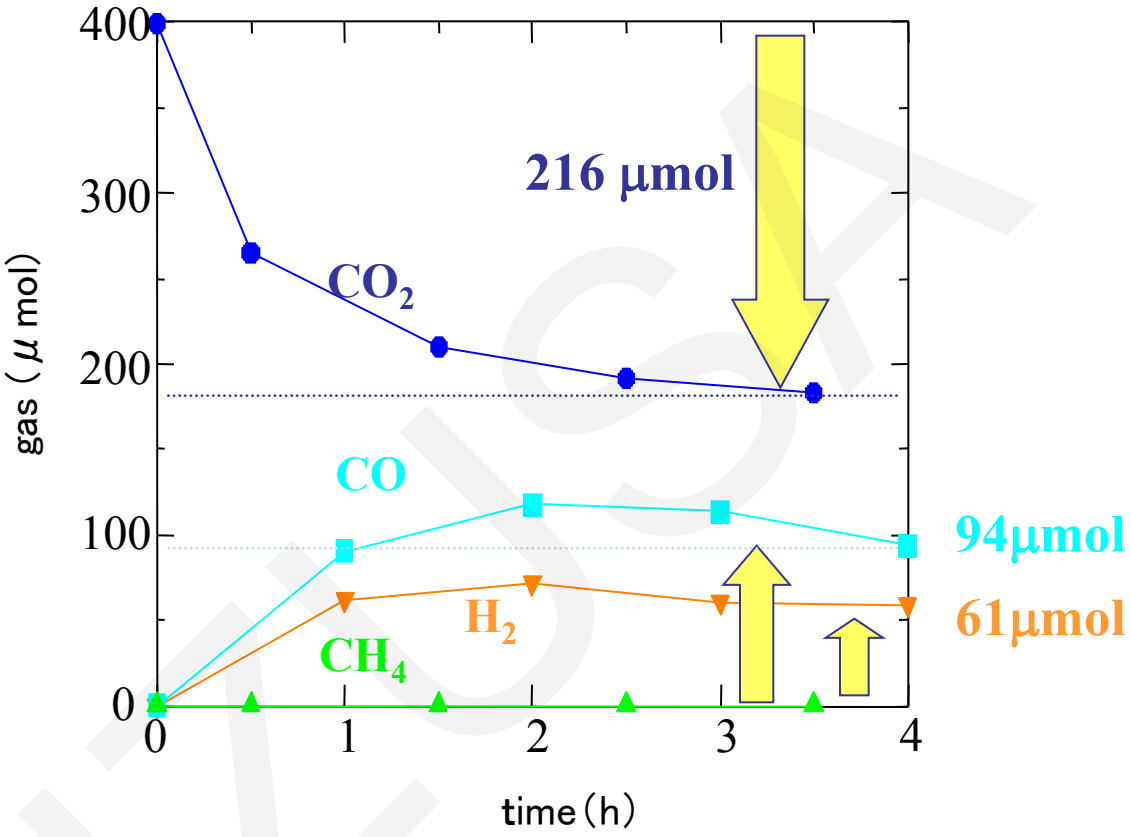
- A CO_2 reforming system using the composite materials of Fe/Al_2O_3 through CO_2-reduction to CO, dissociation of water into hydrogen, and methanol synthesis have been investigated.

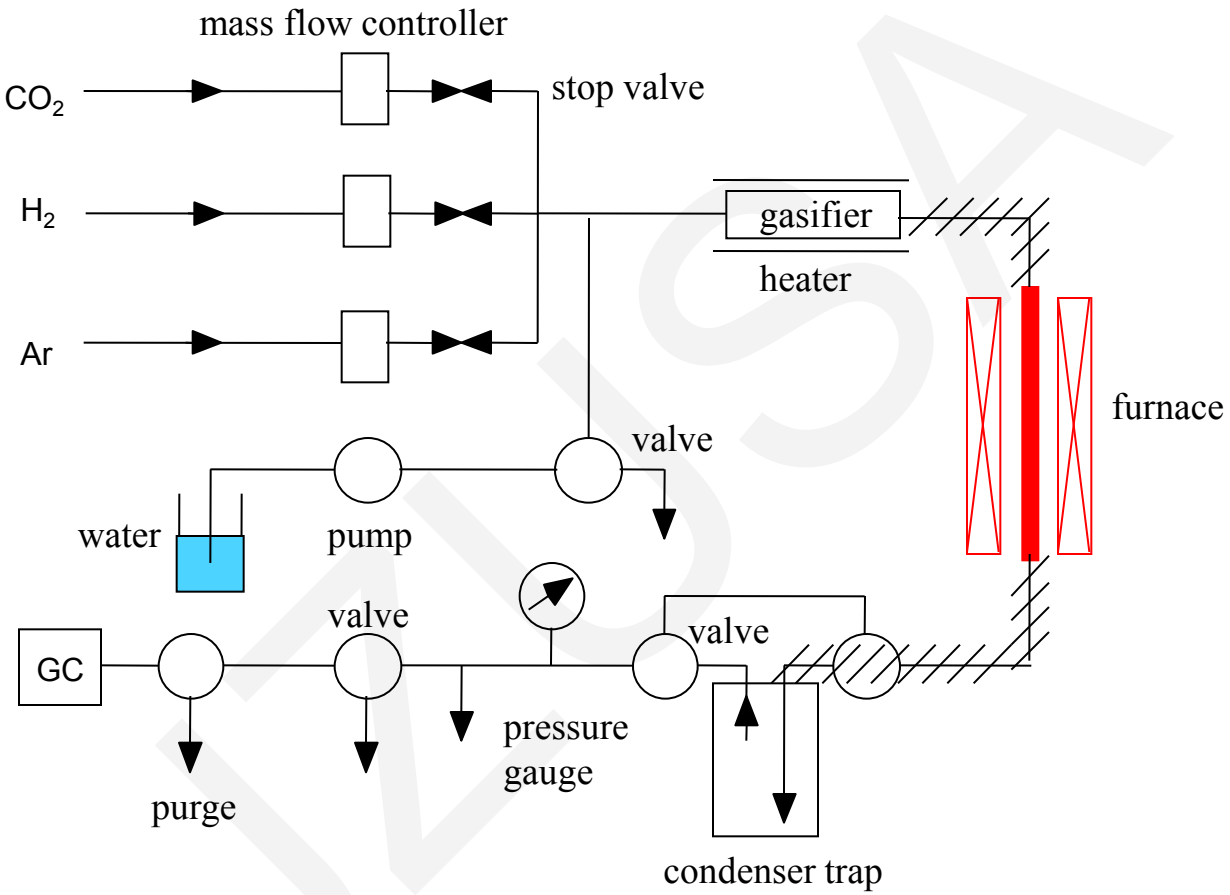


Time-course changes of the components of the gas in the batch type reactor for dry reforming of CO_2 (550 μmol) with Fe (1 mmol) at 500 ˚C for 3h, and water (50 μl) after substitution of the inner gas to argon at 300 ˚C for 3 h

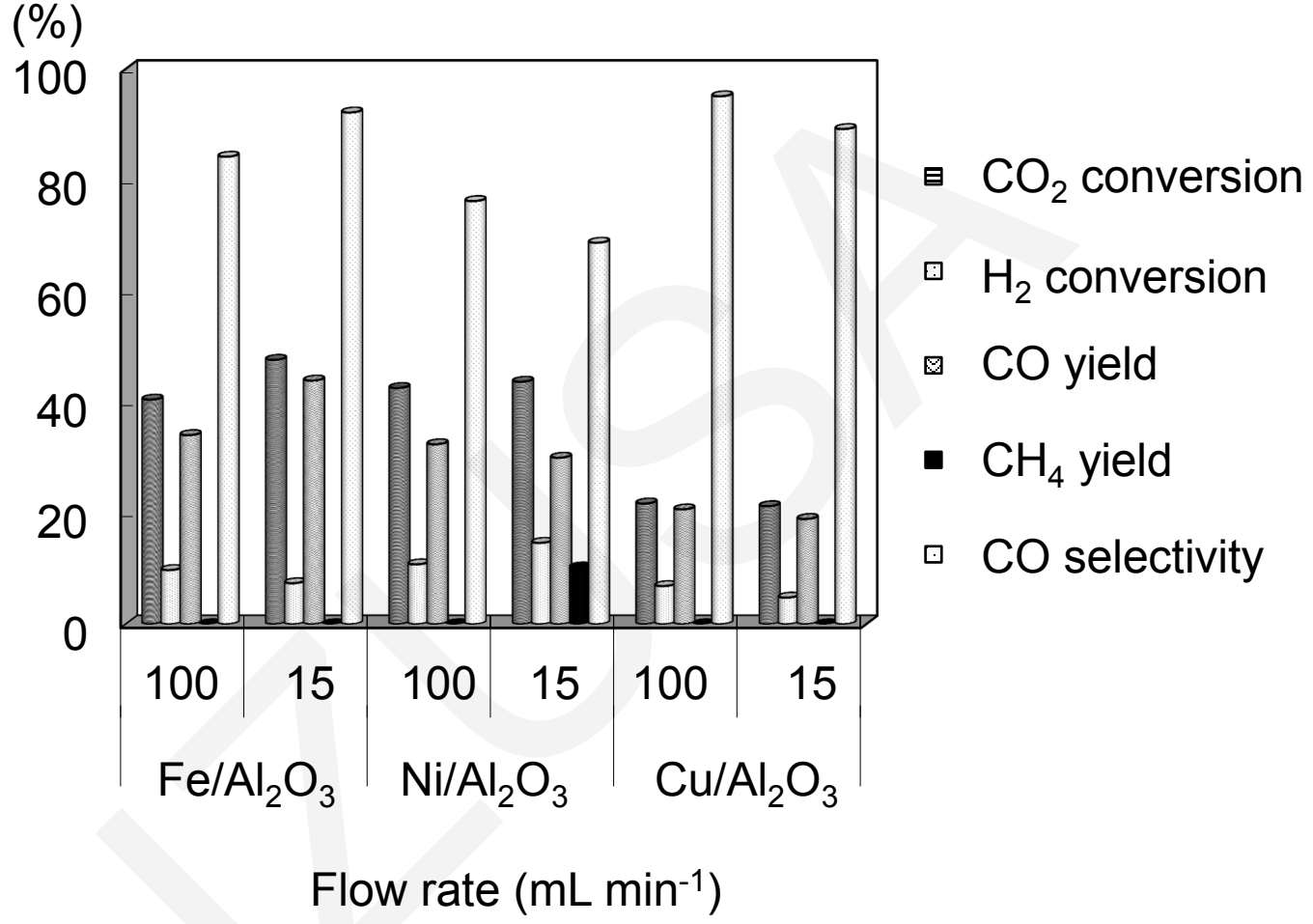


Time-course changes of the components of the gas in the batch type reactor for CO_2 (400 μmol) steam reforming with Fe (1 mmol) and water (10 μl) at 500 ˚C

- Dry and steam reforming of CO_2 produced almost the same amount of CO. At a temperature above 500 ˚C, maximal and saturated yields of CO and H_2 from CO_2 and water were obtained.



Schematic illustration of a fixed-bed flow reactor



Hydrogenation of CO_2 with 1 mmol of Fe-, Ni-, or Cu of 35 wt% metal–loaded Al_2O_3 under the flow of $H_2/CO_2 = 4$, at 500 ˚C for 1.5 h

- Conversion of CO_2 was reduced to 76%, while 9% of methane was detected when Ni was used instead of Fe. While the selectivity of CO from CO_2 increased to 95% in the case of Cu though the CO_2-conversion reduced half of the Fe.