

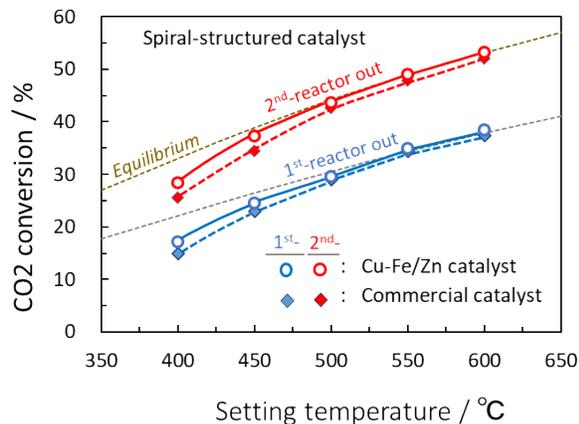
## **Low-Temperature RWGS Process with a Two-Stage Cu-Fe/Zn Spiral-structured Catalyst: Role of Intermediate Fe Plating in Electroless Plating**

Hiroshi Akama<sup>a</sup>, Nakazawa Yuma<sup>a</sup>, Ryo Watanabe<sup>a,\*</sup>, Choji Fukuhara<sup>a,\*</sup>

*a) Department of Applied Chemistry and Biochemical Engineering, Graduate School of Engineering, Shizuoka University, 3-5-1 Johoku, Chuo-ku, Hamamatsu, Shizuoka 432-8561, Japan*

(\* [corresponding author: watanabe.ryo@shizuoka.ac.jp](mailto:watanabe.ryo@shizuoka.ac.jp))

Figure S1 Comparison of the catalytic performance of spiral structured catalysts: Cu–Fe/Zn and a commercial catalyst.



Pretreatment condition: air flow of 100 mL/min at 300°C for 1h.

Reaction gas flow rate: 1.0 L/min.

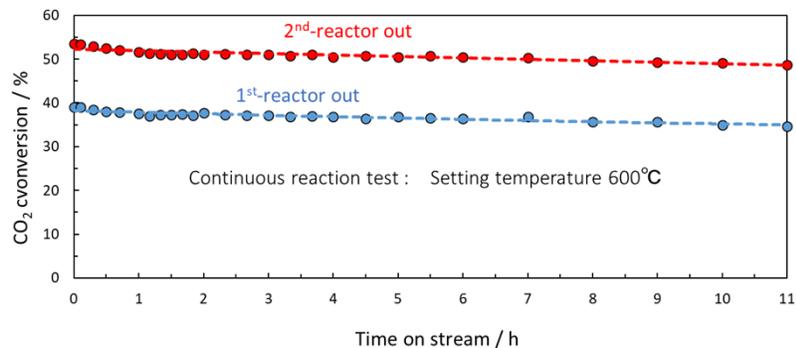
Reaction gas composition: H<sub>2</sub>/CO<sub>2</sub>/N<sub>2</sub> = 2/2/1

GHSV per reactor : 7,800 h<sup>-1</sup> ; linear velocity : 430 mm/s ; contact time : 0.46 s.

Table S1 Catalyst loading, BET surface area and surface Cu element for the ELP-Cu-Fe/Zn catalyst and commercial CuO/ZnO/Al<sub>2</sub>O<sub>3</sub> catalyst.

Catalyst	Catalyst Loading / mg plate <sup>-1</sup> Plate size : w7mm-L200mm	BET surface area after oxidation at 300°C / m <sup>2</sup> g <sup>-1</sup>	Total surface area / m <sup>2</sup>	Surface Cu ratio	Surface Cu □□ / a.u.
ELP-Cu-Fe/Zn	510	35	17.8	0.7	12.4
Commercial CuO-ZnO	390	66	25.5	0.48	12.4

Figure S2 Evaluation of the stability of Cu-Fe/Zn spiral-structured catalyst : Continuous reaction test.  
Pretreatment condition : air flow of 100 mL/min at 300°C.



Pretreatment condition: air flow of 100 mL/min at 300°C for 1h.

The reaction gas flow rate: 1.0 L/min.

The reaction gas composition was set to H<sub>2</sub>/CO<sub>2</sub>/N<sub>2</sub> = 2/2/1

GHSV per reactor: 7,800 h<sup>-1</sup>, LV: 430 mm/s, Contact time : 0.46 s.

## Catalyst performance after a stepwise temperature test from 400°C to 600°C. Continuous reaction test of the Cu-Fe/Zn spiral structured catalyst at 600°C following 60 minutes of reaction at each temperature. Accordingly, 5 hour reaction test was performed prior to commencing the continuous test at 600°C.