Manufacture of highly loaded Ni catalysts by carbonization-oxidation-reduction for dry reforming of methane

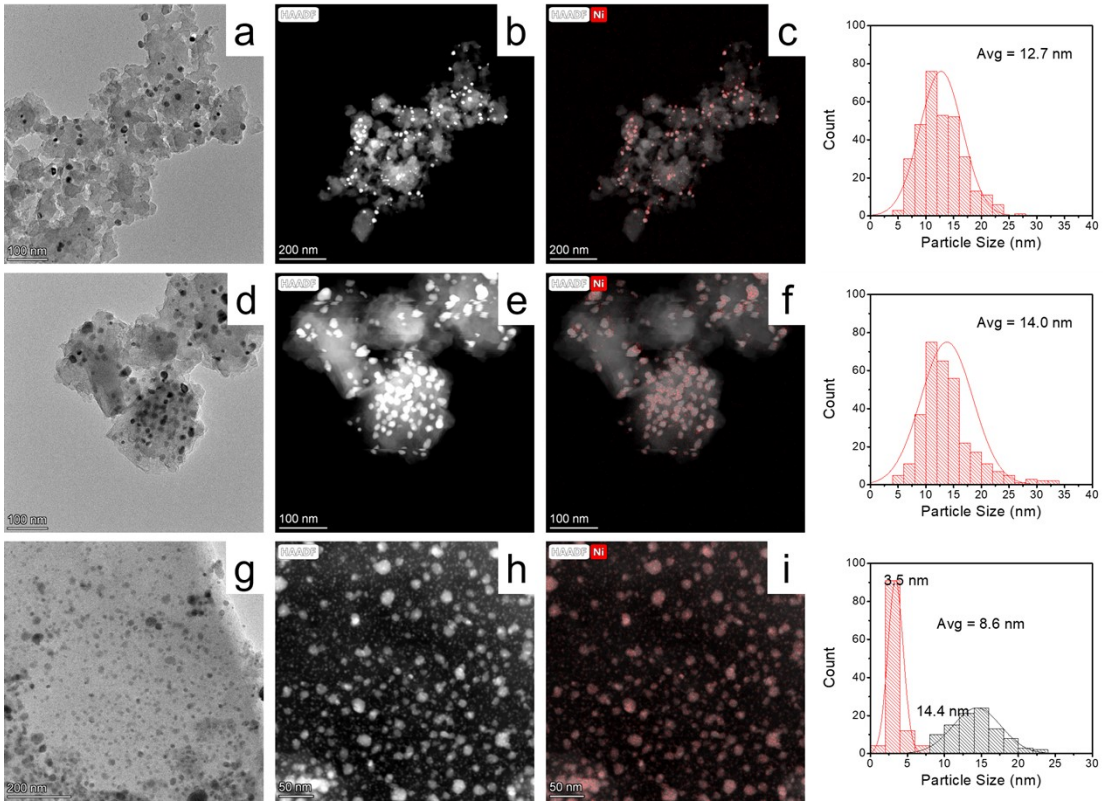
Yue Bai*[a], Dongyang Shen*[b], Guowang Yu[a], Jie Wang[a], Shuai Lyu[a], Yuhua Zhang[a], Guanghui Wang[b], Jinlin Li†[a], Lin Li†[a]

[a]Key Laboratory of Catalysis and Energy Materials Chemistry of Ministry of Education & Hubei Key Laboratory of Catalysis and Materials Science, South-Central Minzu University, Wuhan 430074, China.

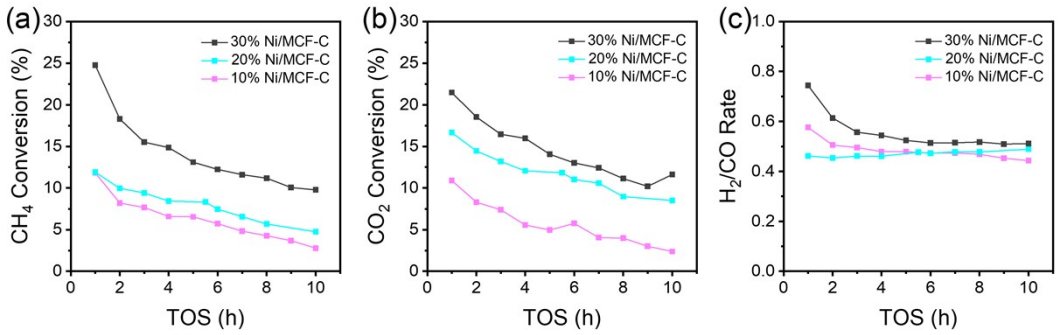
[b]Hubei Key Laboratory of Coal Conversion and New Carbon Material, School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan 430081, China.

†Correspondence and requests for materials should be addressed to L. Li (E-mail: lilinchem@126.com) or to J. Li (E-mail: jinlinli@aliyun.com)

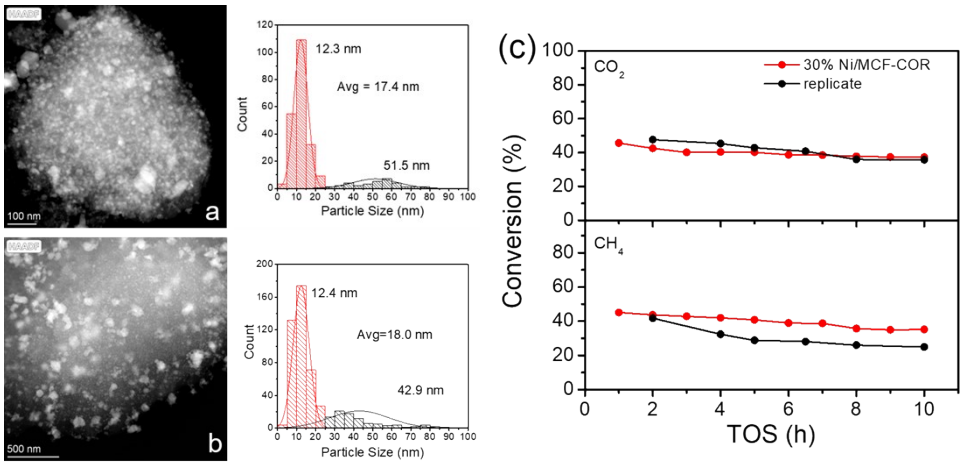
*These authors contributed equally to this work.



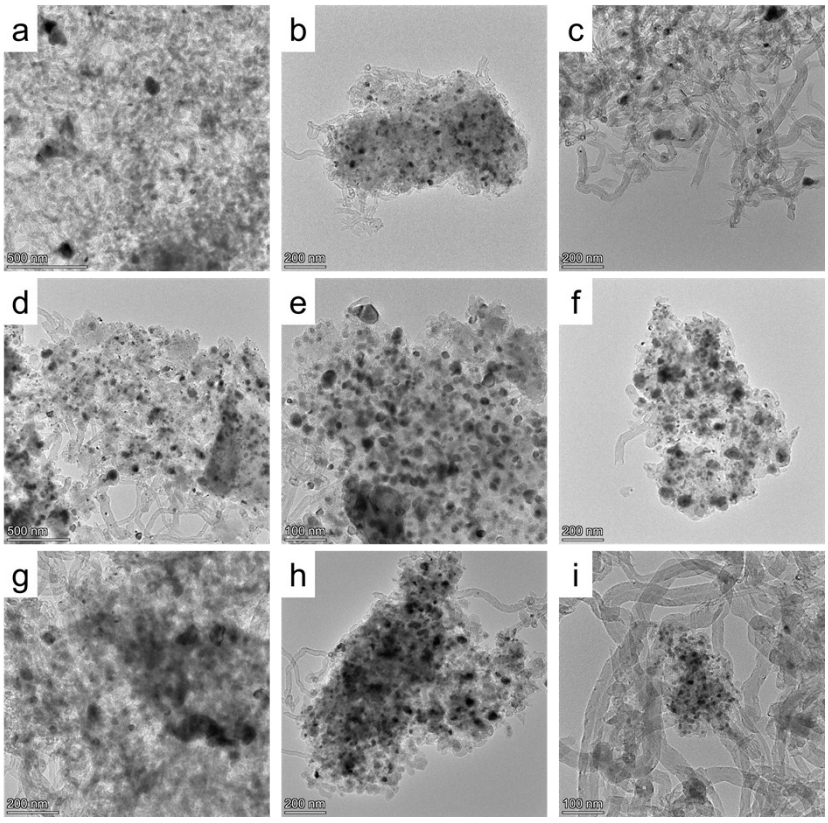
Supplementary Figure 1. TEM, HAADF, and EDS-Mapping of (a-c) 10% Ni/MCF-C, (d-f) 20% Ni/MCF-C, and (g-i) 30% Ni/MCF-C.



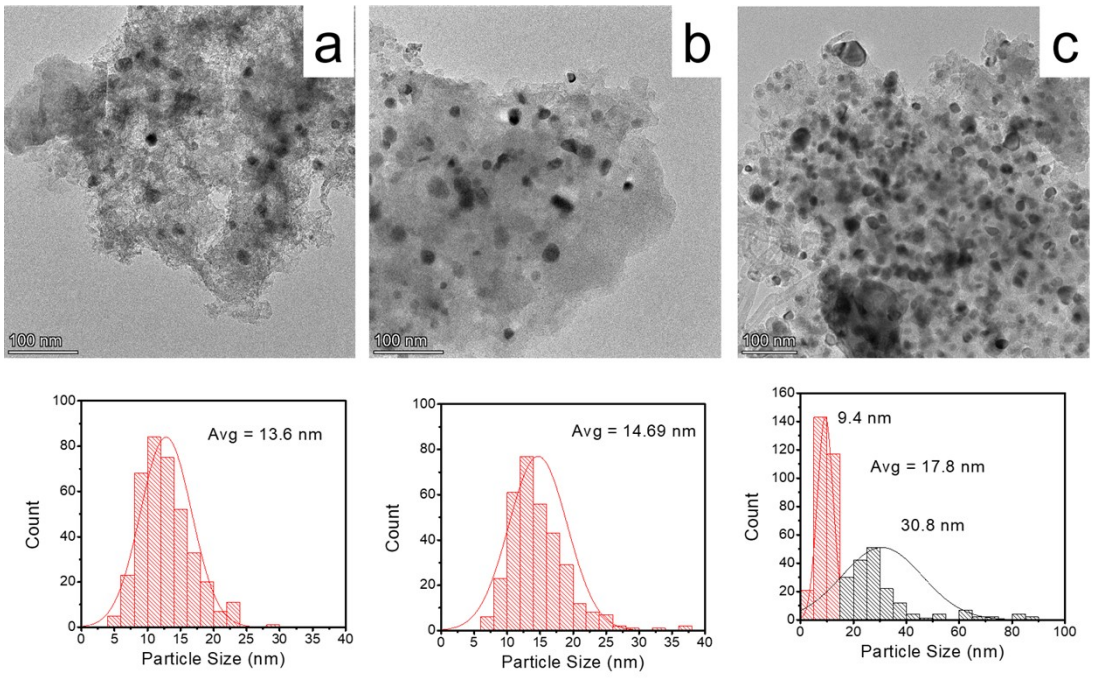
Supplementary Figure 2. Catalytic stability tests under the reaction conditions: $m_{cat.}$ = 0.2 g, CH_4 : CO_2 : N_2 = 1 : 1 : 2, T = 600 °C, GHSV = 36 $L \cdot g_{cat}^{-1} \cdot h^{-1}$. (a) CH_4 conversion, (b) CO_2 conversion, and (c) the rate of H_2/CO.



Supplementary Figure 3. HAADF and size distribution of (a) 30% Ni/MCF-COR and (b) replicate, (c) catalytic performance. Reaction conditions: $m_{cat.}$ = 0.2 g, CH_4 : CO_2 : N_2 = 1 : 1 : 2, T = 600 °C, GHSV = 36 $L \cdot g_{cat}^{-1} \cdot h^{-1}$.



Supplementary Figure 4. TEM of used (a-c) 30% Ni/MCF-H_2, (d-f) 30% Ni/MCF-C, and (g-i) 30% Ni/MCF-COR.



Supplementary Figure 5. TEM, HAADF, and EDS-Mapping of used (a) 10% Ni/MCF-C, (b) 20% Ni/MCF-C, and (c) 30% Ni/MCF-C.