

## *Electronic Supplementary Information*

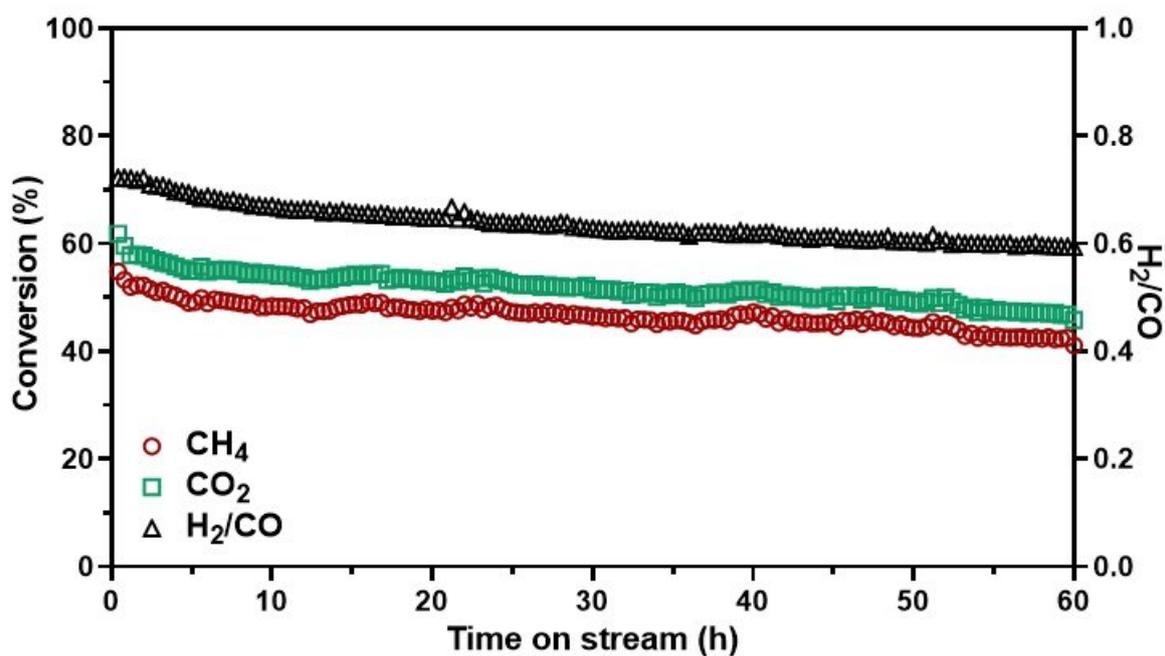
### **Al<sub>2</sub>O<sub>3</sub>-Coated Ni/CeO<sub>2</sub> Nanoparticles as Coke-Resistant Catalyst for Dry Reforming of Methane**

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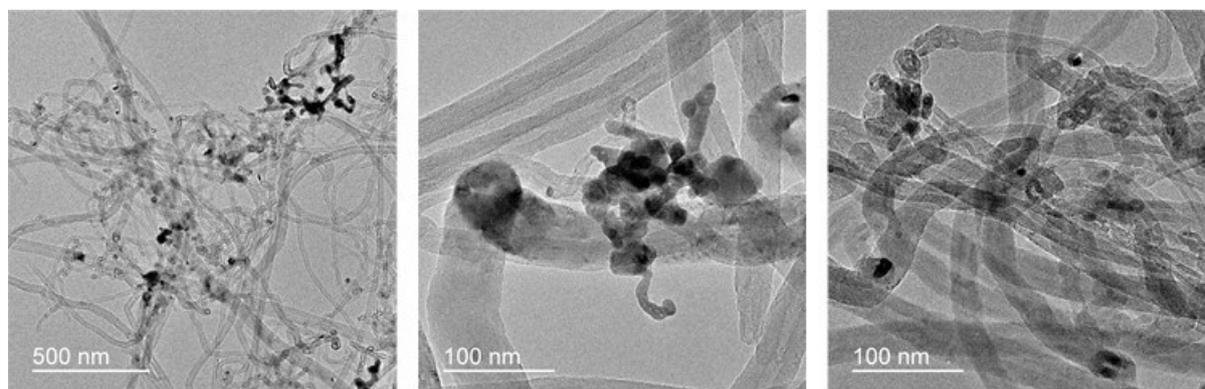
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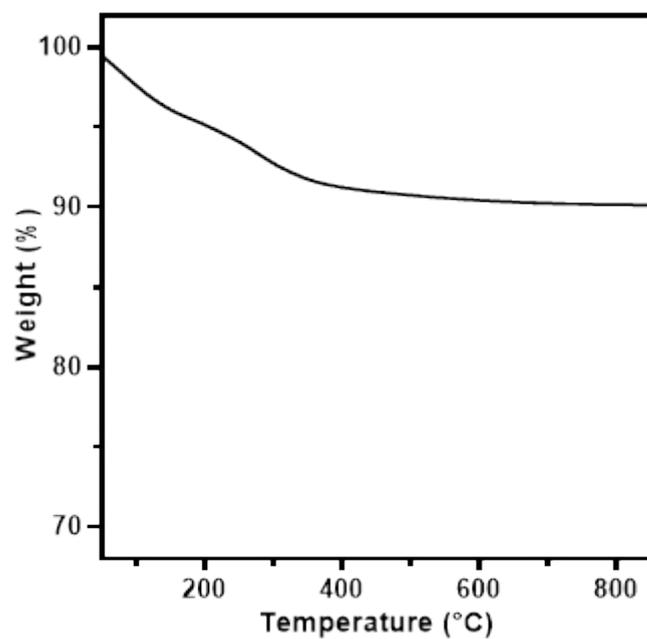
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[kjan@unist.ac.kr](mailto:kjan@unist.ac.kr))



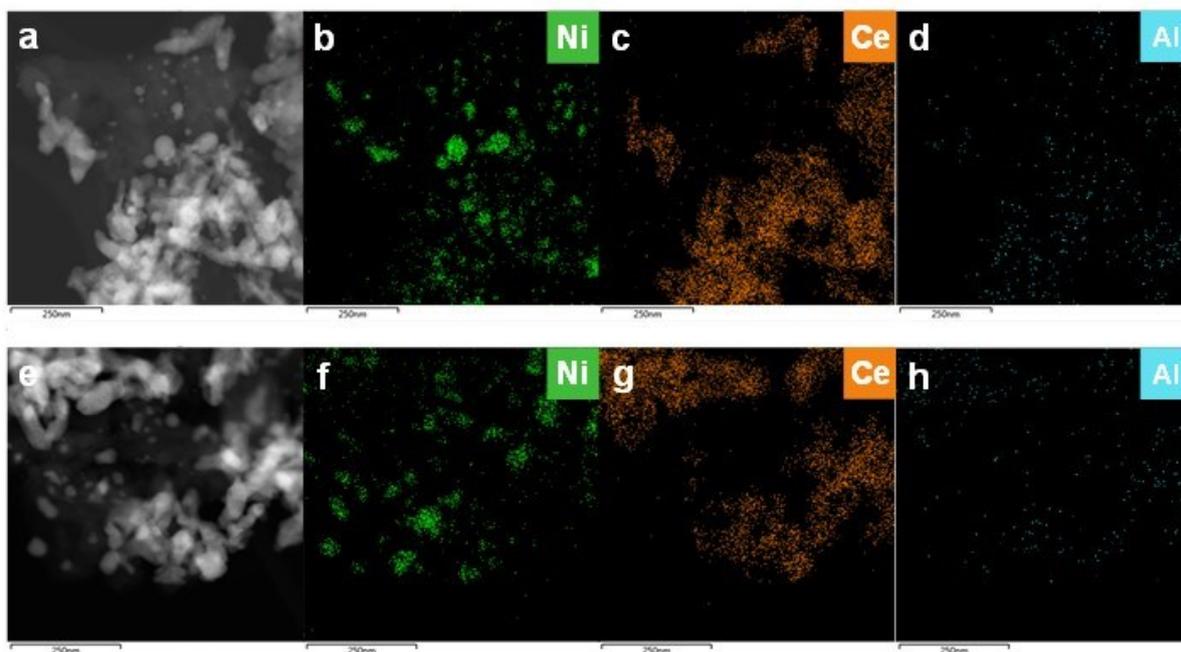
**Fig. S1** Continuous DRM reaction of a Ni/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>-(I) catalyst showing CH<sub>4</sub> and CO<sub>2</sub> conversions and the H<sub>2</sub>/CO ratio. Reaction conditions: CH<sub>4</sub>/CO<sub>2</sub>/N<sub>2</sub> volume ratio of 1:1:1, 700 °C, 60 h, atmospheric pressure,  $W_{cat} = 20$  mg, GHSV = 90,000 mL g<sub>cat</sub><sup>-1</sup> h<sup>-1</sup>, and 45 sccm.



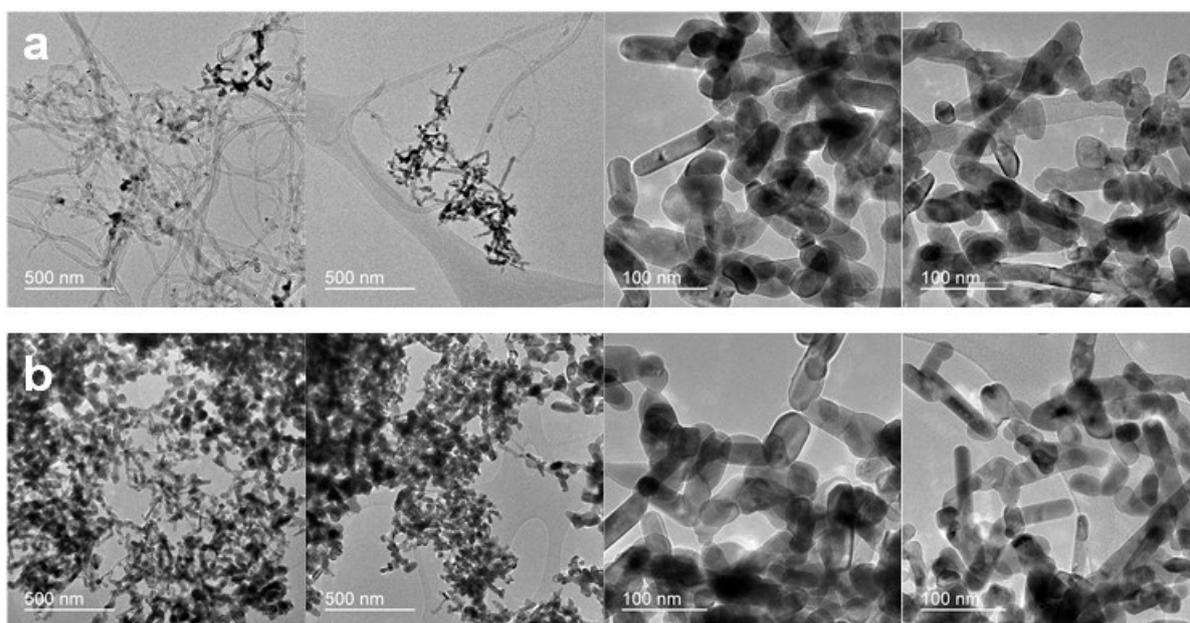
**Fig. S2** TEM images of the spent Ni/CeO<sub>2</sub> catalyst, showing agglomeration of NPs and carbon growth on Ni.



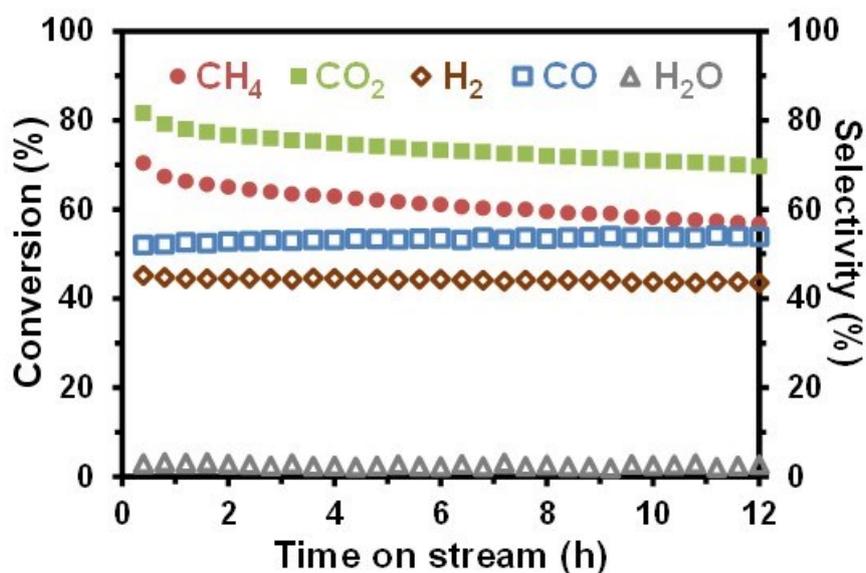
**Fig. S3** TGA measurement of a CeO<sub>2</sub> NR.



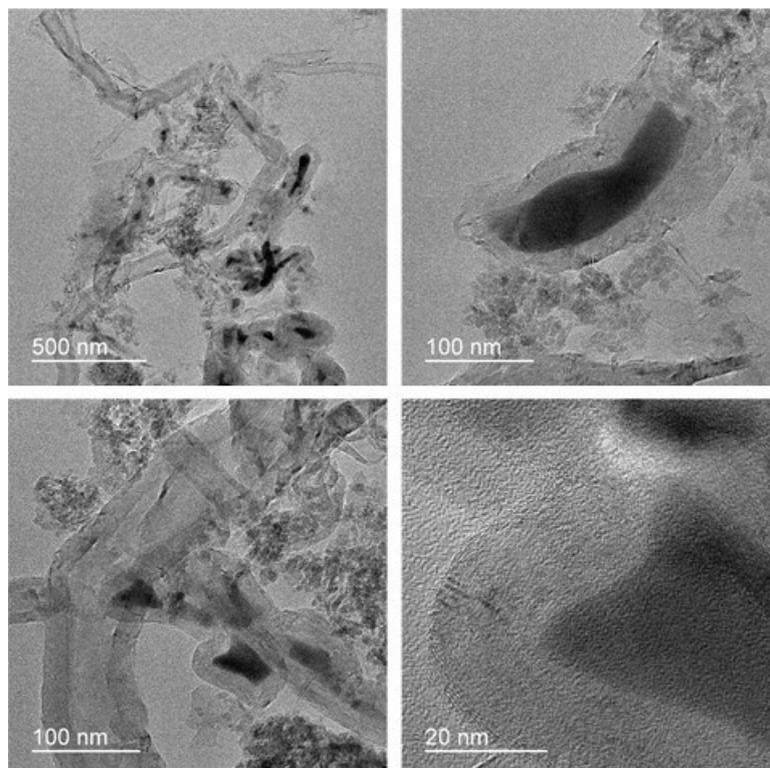
**Fig. S4** HAADF-STEM images (a and e) and the corresponding EDS profile (b–d and f–h) of the spent Ni/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>-(I) catalyst.



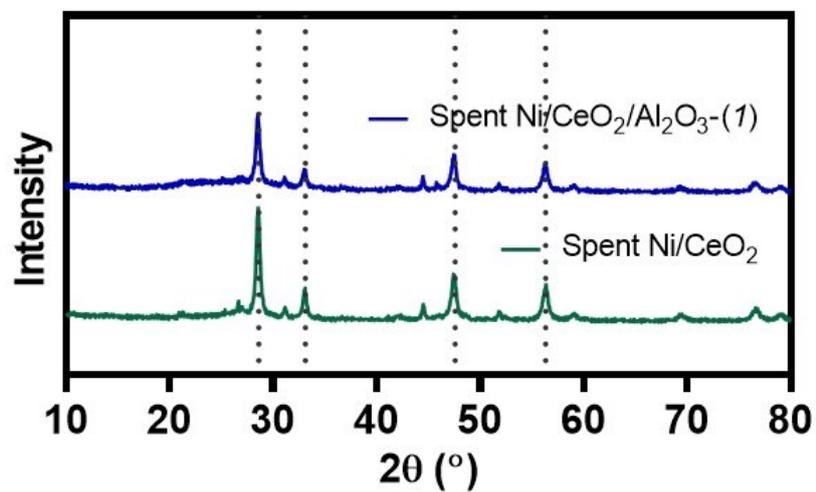
**Fig. S5** TEM images of the spent (a) Ni/CeO<sub>2</sub> and (b) Ni/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>-(I) catalysts.



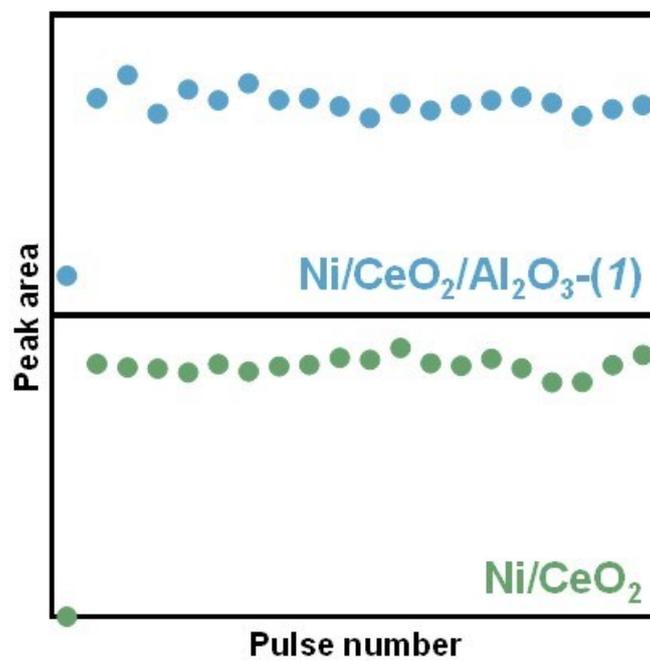
**Fig. S6** Conversion and selectivity obtained from a Ni/Al<sub>2</sub>O<sub>3</sub> catalyst in DRM reaction at 700 °C as a function of time on stream. Reaction conditions: 50 sccm of CH<sub>4</sub>/CO<sub>2</sub>/N<sub>2</sub> volume ratio of 1:1:3 (v/v/v), atmospheric pressure, W<sub>cat</sub> = 50 mg.



**Fig. S7** TEM images of the spent Ni/Al<sub>2</sub>O<sub>3</sub> catalyst.



**Fig. S8** XRD patterns of the spent Ni/CeO<sub>2</sub> and Ni/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>-(1) catalysts.



**Fig. S9** CO chemisorption measurement of Ni/CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub>-(1) and Ni/CeO<sub>2</sub> catalysts.