

Polymetallic doping of Mn-based perovskite oxides for chemical looping dry reforming of methane

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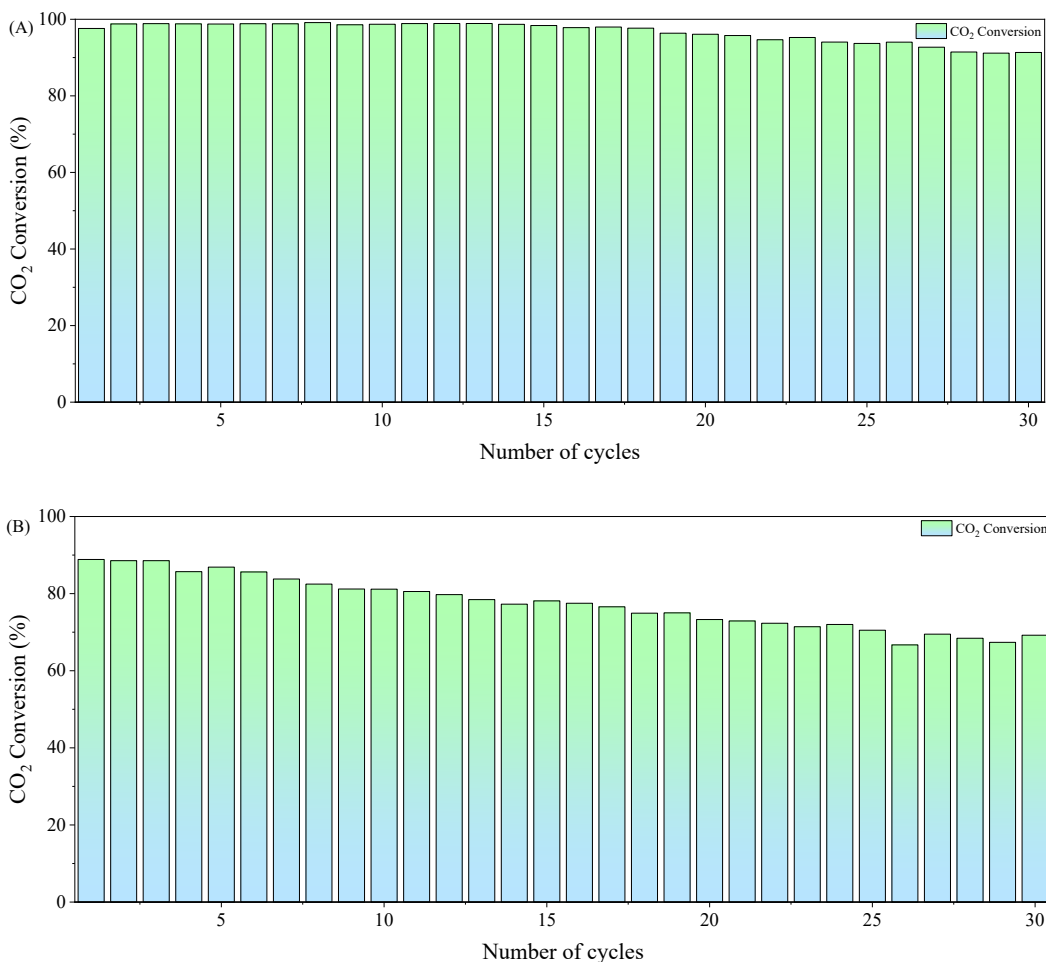


Fig. S1. CO₂ conversion of thirty redox cycles at 850°C (a) Sr_{0.8}Ce_{0.2}Mn_{0.7}Cu_{0.1}Ni_{0.2}O_{3-δ}; (b) Sr_{0.8}Ce_{0.2}Mn_{0.7}Ni_{0.3}O_{3-δ}. Reaction conditions: m= 300 mg; F_{CH₄/Ar} =50 Ncm³/min (5% CH₄/Ar); F_{CO₂}=50 Ncm³/min (5% CO₂); F_{Ar} =50 Ncm³/min (99.999% Ar).

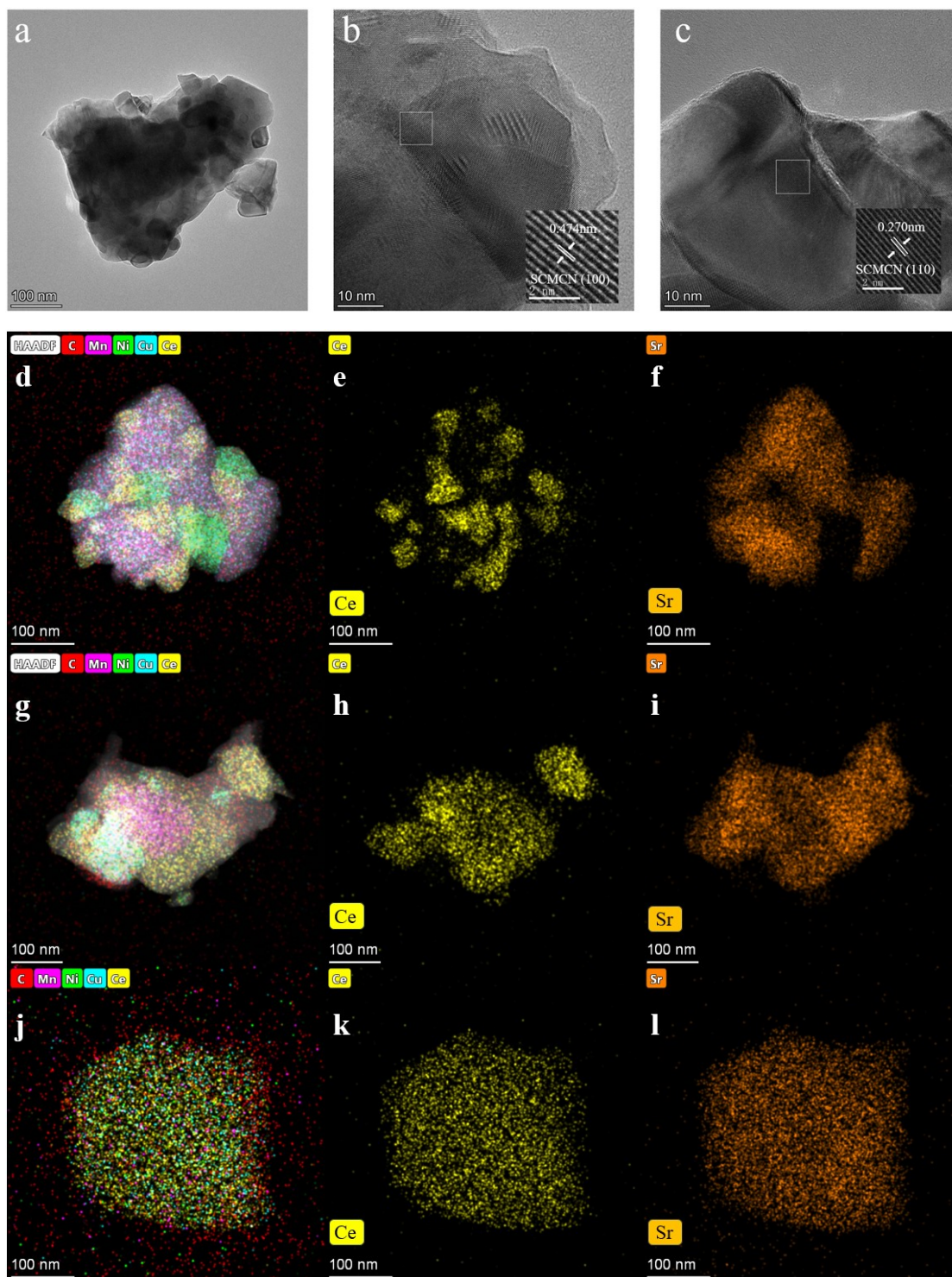


Fig. S2. TEM images of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Cu}_{0.1}\text{Ni}_{0.2}\text{O}_{3-\delta}$ (a-c) and EDS mapping (Ce, Sr) of fresh (d-f), reduced (g-i) and cycled (j-l) $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Cu}_{0.1}\text{Ni}_{0.2}\text{O}_{3-\delta}$.

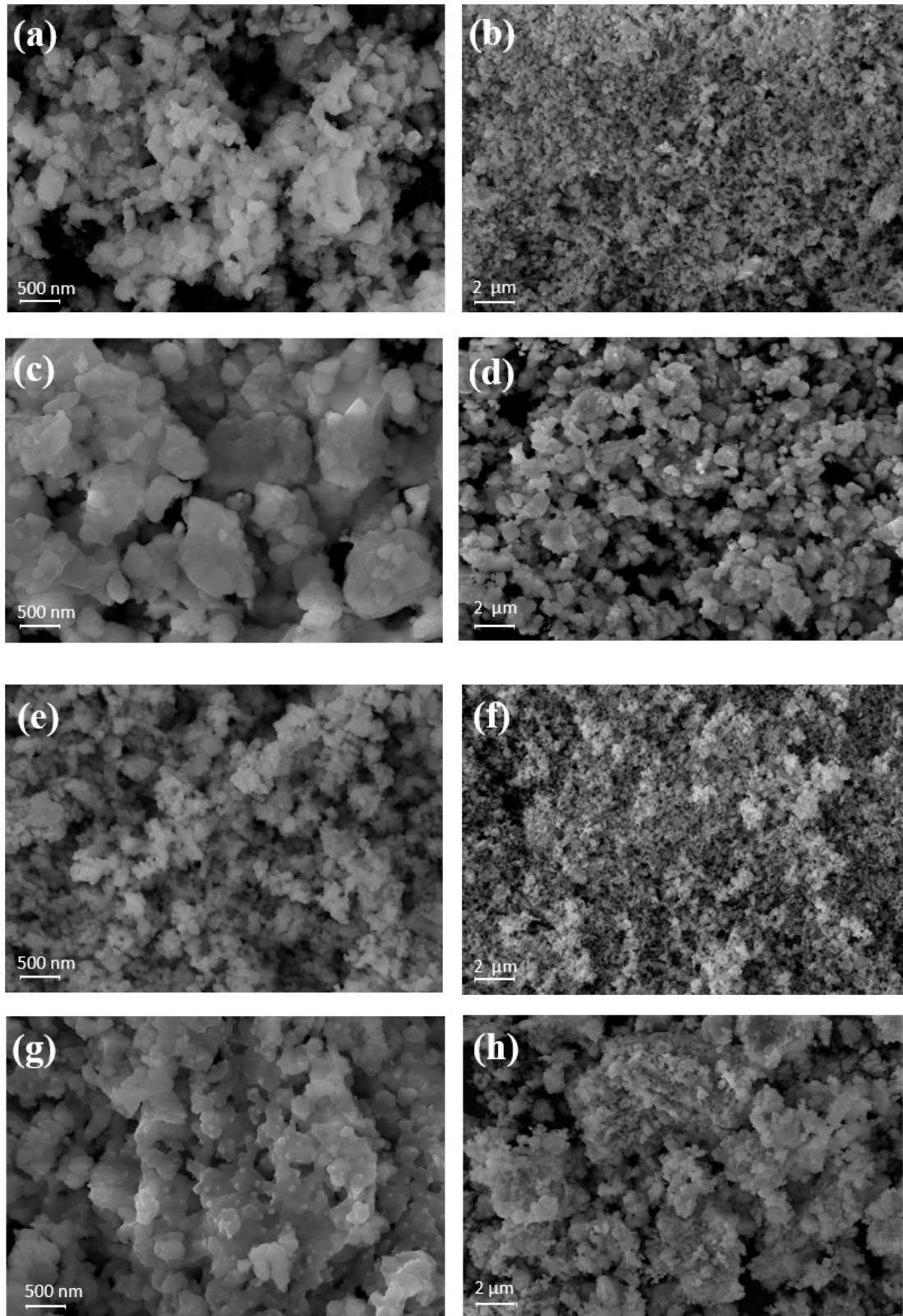


Fig. S3. SEM images of fresh and 30-cycle samples of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Cu}_{0.1}\text{Ni}_{0.2}\text{O}_{3-\delta}$ and $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Ni}_{0.3}\text{O}_{3-\delta}$. (a-b) Fresh sample of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Cu}_{0.1}\text{Ni}_{0.2}\text{O}_{3-\delta}$. (c-d) Cycled sample of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Cu}_{0.1}\text{Ni}_{0.2}\text{O}_{3-\delta}$. (e-f) Fresh sample of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Ni}_{0.3}\text{O}_{3-\delta}$. (g-h) Cycled sample of $\text{Sr}_{0.8}\text{Ce}_{0.2}\text{Mn}_{0.7}\text{Ni}_{0.3}\text{O}_{3-\delta}$.