Supporting Information

$SrFe_{1-x}Sn_xO_{3-\delta}$ nanoparticles with enhanced redox properties for catalytic combustion of benzene

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Table S1 Lattice constant values for $SrFe_{1-x}Sn_xO_{3-\delta}$ samples.

Sample	2θ (degree) [a]	Lattice constant (Å)		
		a	*b*	*c*
SFO	32.77	3.860	3.861	3.859
SFSO25	32.26	3.920	3.918	3.925
SFSO50	31.76	3.980	3.972	3.972
SFSO75	31.54	4.007	4.003	4.008
SSO	31.33	4.033	4.030	4.033

[a] Diffraction angle for the strongest line between 31 to 33°.

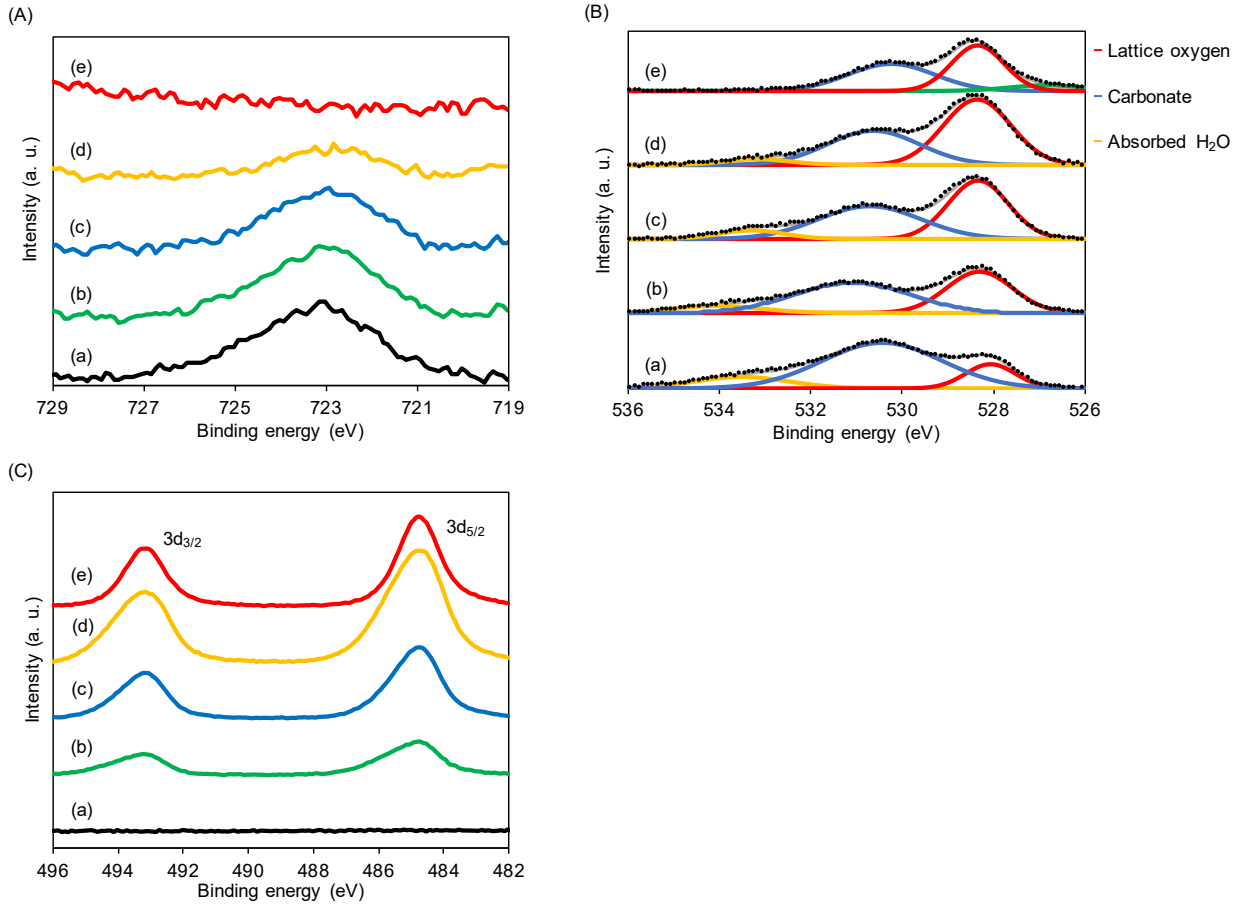

Fig. S1 X-ray photoelectron spectra of (a) SFO, (b) SFSO25, (c) SFSO50, (d) SFSO75, and (e) SSO. (A) Fe $2p_{1/2}$, (B) O 1s, and (C) Sn 3d orbitals.

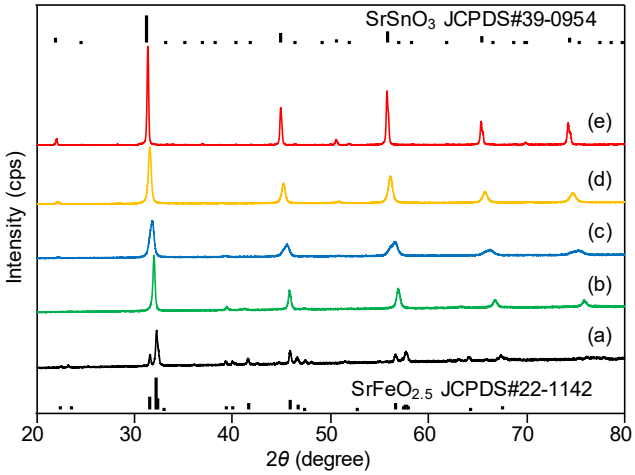

Fig. S2 XRD patterns of (a) SFO, (b) SFSO25, (c) SFSO50, (d) SFSO75, and (e) SSO after the measurement of H_2-TPR.

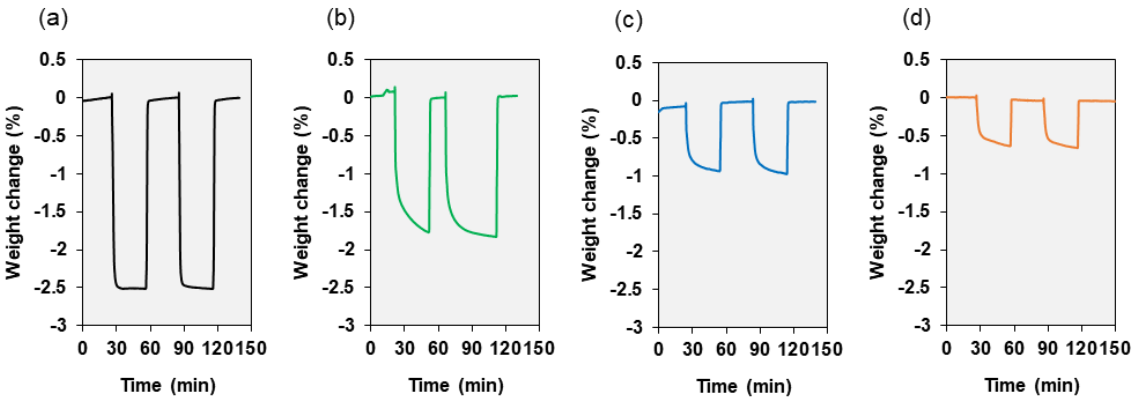

Fig. S3 TG profiles of $SrFe_{1-x}Sn_xO_{3-\delta}$ obtained by alternately switching reductive/oxidative gas flow. (a) SFO, (b) SFSO25, (c) SFSO50, and (d) SFSO75.

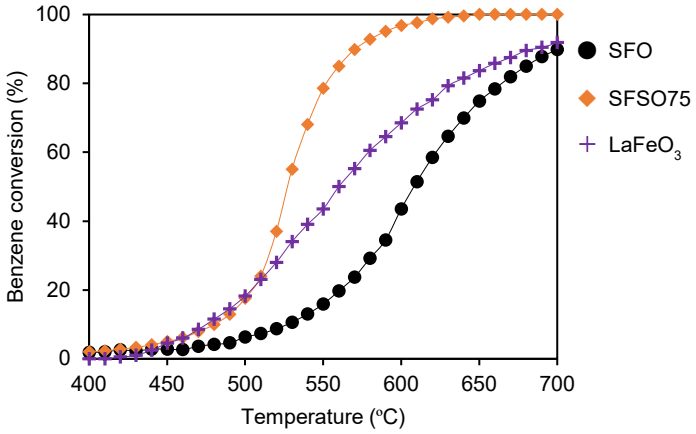

Fig. S4 Light-off curves for catalytic combustion of benzene over SFO, SFSO75, and $LaFeO_3$.

$LaFeO_3$ was prepared by the polymerized complex method and calcined at 1000 °C.

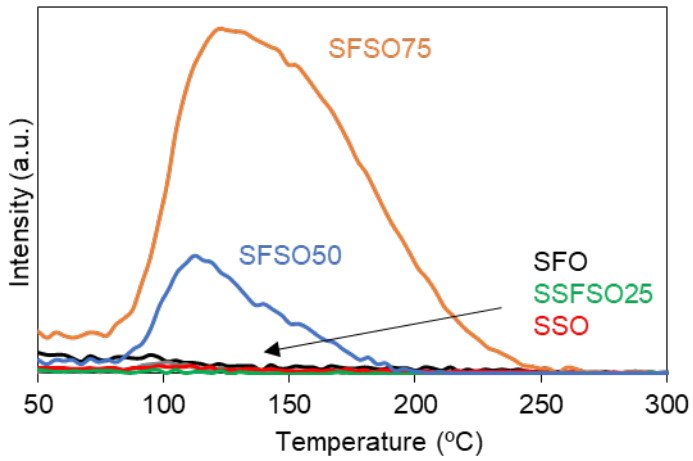

Fig. S5 Benzene-TPD profiles of (a) SFO, (b) SFSO25, (c) SFSO50, (d) SFSO75, and (e) SSO.

Benzene-TPD was conducted as follows. A powder sample (0.20 g) was heated at 700 °C for 1 h in O_2 flow and cooled to 50 °C. The gas flow was switched to He (10 mL/min) and the sample was left at the same temperature for 0.5 h. Then, benzene/He (1%, 10 mL/min) was fed for 0.5 h to saturate the adsorption. The gas flow was switched to He (10 mL/min) and weakly adsorbed benzene was purged for 0.5 h. Then, the temperature was increased at a ramp rate of 10 °C/min to 300 °C and benzene in the effluent gas was monitored by a quadrupole spectrometer (m/z =78).

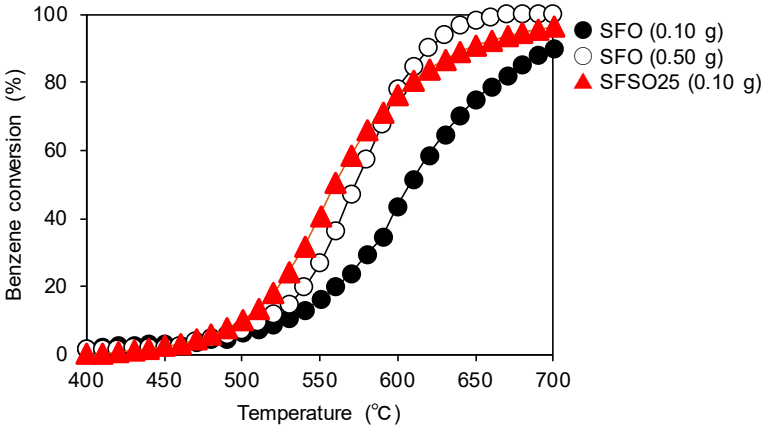

Fig. S6 Temperature dependence of benzene conversion for catalytic combustion of benzene over different amount of SFO and SFSO25.

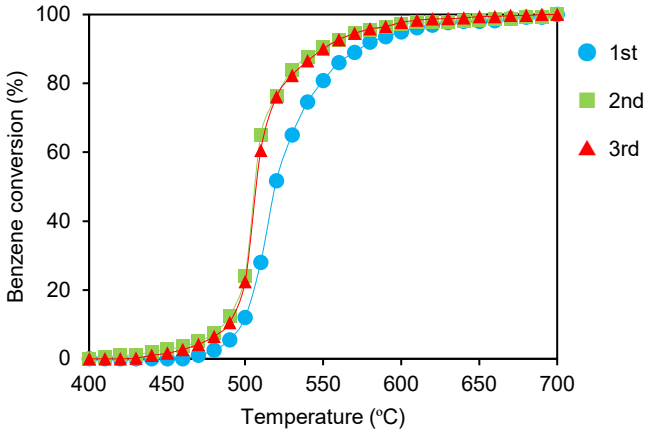

Fig. S7 Reuse of SFSO75 for combustion of benzene.

In each reaction run, only the benzene feed was stopped after the temperature reached 700 °C and the catalyst was kept at the same temperature for 30 min in O_2/He flow. Then, the temperature was decreased to 100 °C in O_2/He flow. The gas flow was switched to benzene/O_2/He flow to start the next reaction run.