Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary materials

S1. Detail of the dynamic oxygen storage capacity calculation

The details of the calculation are presented in Fig. S1, and CA1-f is used as the example. The CO_2 response curve is displayed in Fig. S1-a. The reaction rate of dynamic oxygen storage and the reducing degree are calculated by integrating the area of CO_2 response with the following equations:

$$DOSR = \int_{t1}^{t1+\Delta t} f(x)dx\ [\mu molCO_2/(gs)]$$

$$Reducing\ degree = \frac{\int_{t0}^{t1} f(x)dx\ [\mu molCO_2/g]}{m \times \Phi}$$

where f(x) indicates the CO_2 response curve, t1 is the reaction time at which the calculation is conducted, Δt is the time interval of the data (about 0.3 s in this work), Φ is the amount of total oxygen per gram of CeO_2 and m is the weight of CeO_2 (25 mg),

$$\Phi = \frac{1}{172\ g/mol} = 5.81 \times 10^3\ \mu mol/g$$

Fig. s1-b plots DOSR as a function of reducing degree. One can record the temperature-DOSR correlation at different reducing degree. The Arrhenius curve can be obtained by plotting the LnR with 1/T (Fig. S1-c). Based on this calculation, the activation energy of oxygen release can be calculated at different reducing degree. And the final results were displayed as the correlation between activation energy and reducing degree (Fig. 7, bottom).

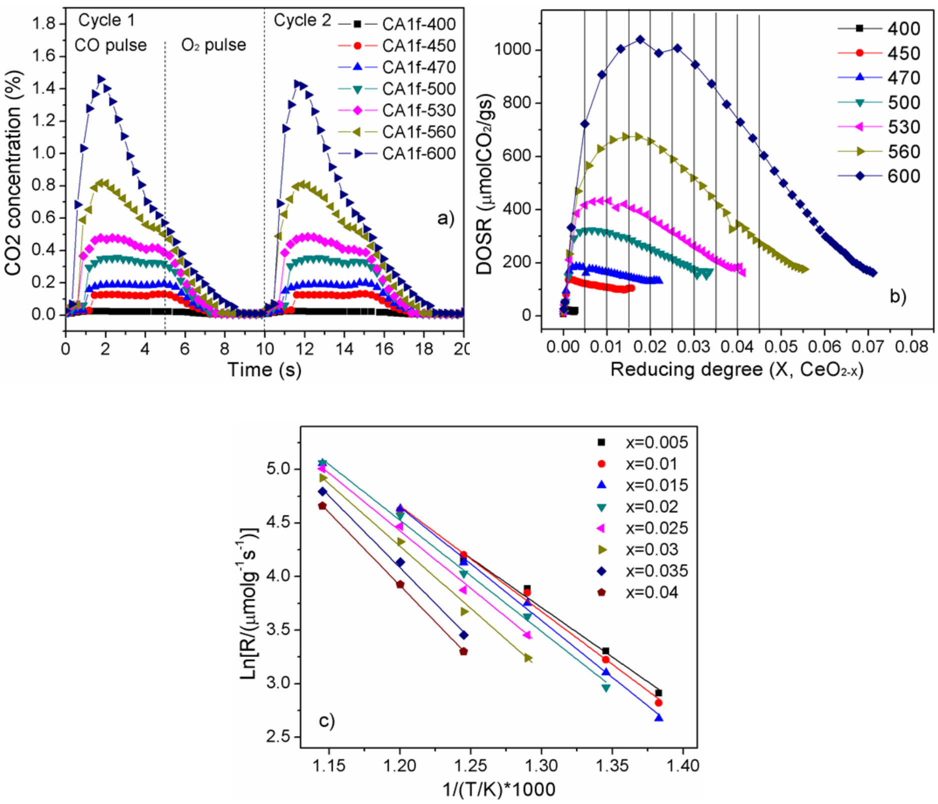

Fig. S1 Calculation process of the DOSC (a, CO_2 response curve; b, correlation between oxygen storage rate and reducing degree; c, Arrhenius curve based on different reducing degree)