Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Tuning the high-entropy perovskite as efficient and reliable electrocatalysts for oxygen evolution reaction

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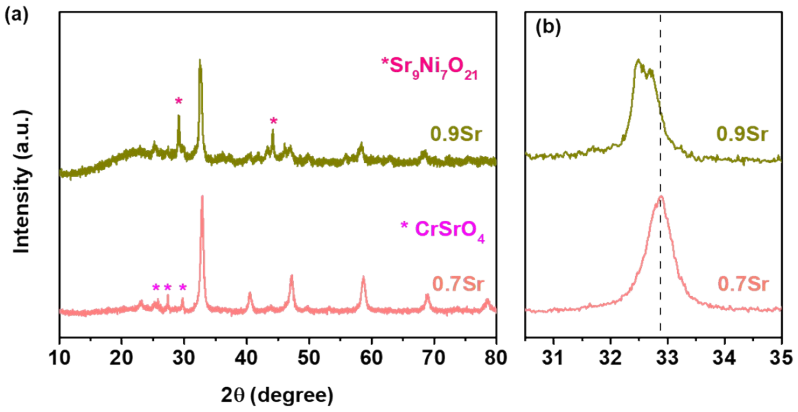

Fig. S1. (a) XRD patterns for 0.7Sr and 0.9Sr. There is a small amount of inactive $CrSrO_4$ impurity in 0.7Sr. In the 0.9Sr, the impurity of $Sr_9Ni_7O_{21}$ is observed, which is active for OER. (b) Expanded XRD patterns. The peak for 0.9Sr shift toward low angle compared with 0.7Sr, which is likely to be caused by the impurity of $Sr_9Ni_7O_{21}$ existed in 0.9Sr.

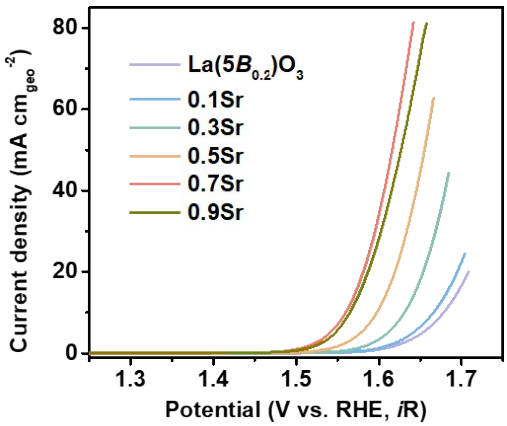

Fig. S2. LSV curves for $La_{1-x}Sr_x(5B_{0.2})O_3$ (x = 0, 0.1, 0.3, 0.5, 0.7 and 0.9). Among them, 0.7Sr delivers the best OER performance. Compared with 0.7Sr, 0.9Sr shows slightly low activity, which may be due to the presence of more $Sr_9Ni_7O_{21}$ impurities.

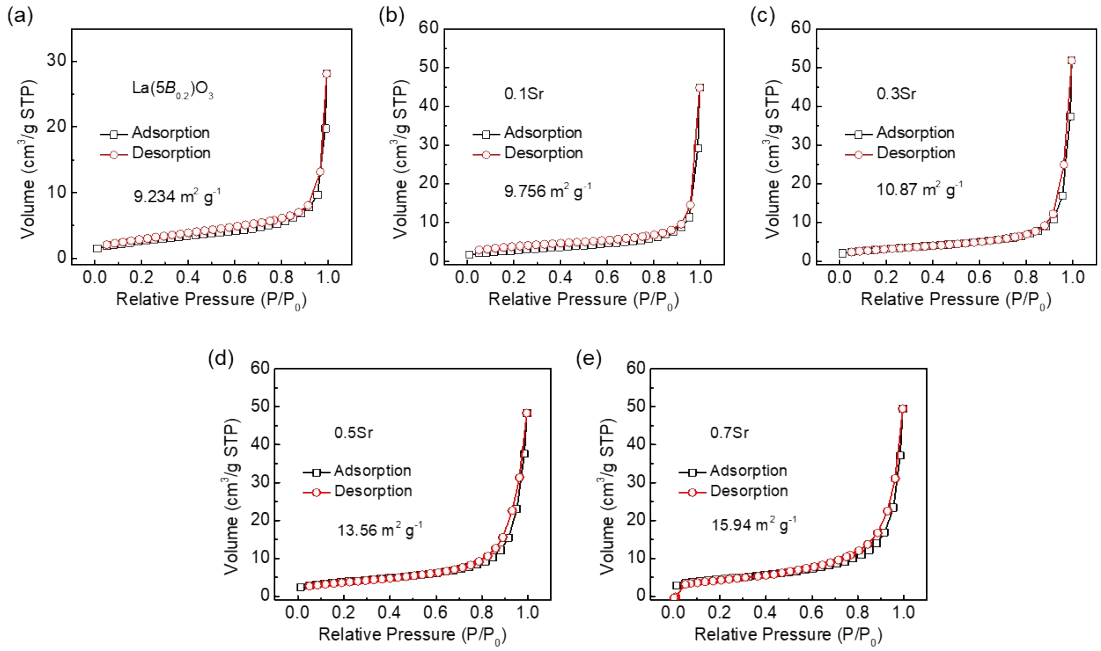

Fig. S3. Brunauer-Emmett-Teller (BET) measurements for $La_{1-x}Sr_x(5B_{0.2})O_3$. Nitrogen adsorption and desorption isotherms measured at 77 K of (a) $La(5B_{0.2})O_3$, (b) 0.1Sr, (c) 0.3Sr, (d) 0.5Sr and (e) 0.7Sr.

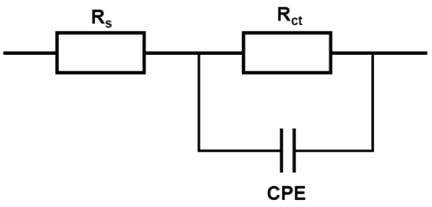

Fig. S4. Equivalent circuit. It consists of an electrolyte resistance (R_s), a charge transfer resistance (R_{ct}), and a constant phase element (CPE).

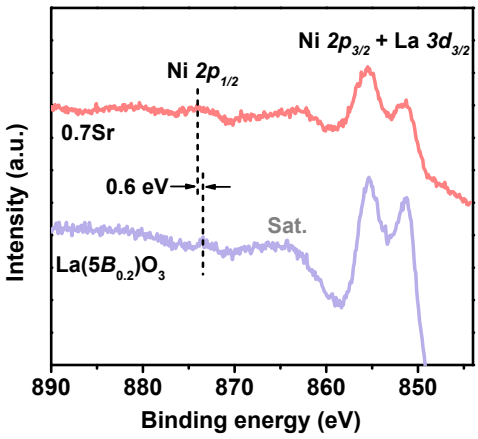

Fig. S5. XPS core level spectra of Ni *2p* for La($5B_{0.2}$)O_3 and 0.7Sr. Compared to La($5B_{0.2}$)O_3, a positive shift of 0.6 eV is observed in Ni $2p_{1/2}$ peak for 0.7Sr, indicating the formation of more high-valence Ni^{3+}.

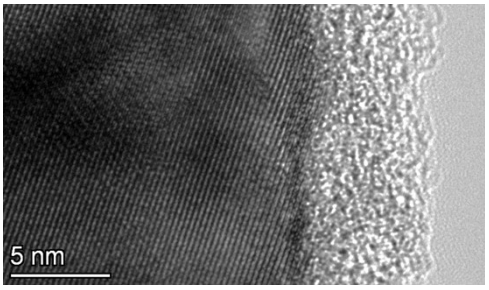

Fig. S6. TEM image for 0.7Sr after OER tests. As seen, an amorphous layer with a thickness of ~5 nm is observed at the surface of catalyst, suggestive of the structural reconstruction during OER.

Table S1. XPS data for $La_{1-x}Sr_x(5B_{0.2})O_3$

Sample	Cr^{6+}/Cr^{3+}	Mn^{4+}/Mn^{3+}	Fe^{4+}/Fe^{3+}	Fe^{3+}/Fe^{2+}	Co^{4+}/Co^{3+}	Co^{3+}/Co^{2+}	Ni^{3+}/Ni^{2+}	$OH_{adsorbed}/O_{Lattice}$
$La(5B_{0.2})O_3$	**1.10**	**0.72**	**0**	**3.32**	**0**	**1.35**	**0**	**0.96**
0.7Sr	**2.62**	**5.09**	**0.37**	**-10.5**	**0.67**	**2.53**	**1.26**	**2.86**