Supplementary Information for

Remarkably Enhanced Lattice Oxygen Participation in Perovskites to Boost Oxygen Evolution Reaction

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Supplementary discussion.

S1. The OER stability data

The OER stability data were recorded after 1st and 50th cycles, which shows that SCO-A is quite stable and defects are not in excessive amounts to disrupt the crystal structures rather than the surface defects to improve LOM participation in perovskite to boost OER kinetics (Figure S4).

Table S1. A comparative chart for overpotential (η) of perovskite materials used as OER electrocatalyst.

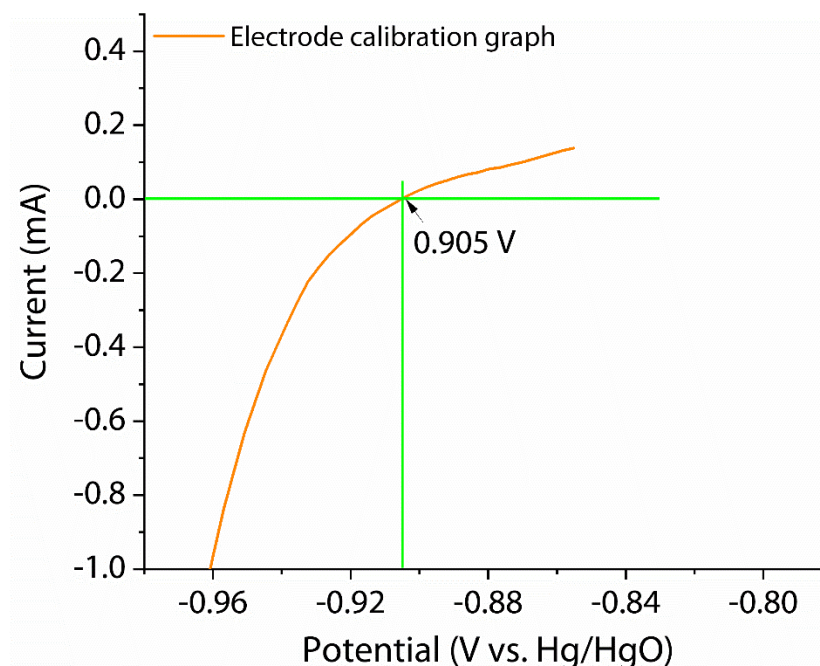| Catalysts	η @ 10 mA cm^{-2} (mV)	Condition (Electrolyte)	Refs.
SCO	400	1 M KOH	this work
SCO-A	380	1 M KOH	this work
$Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ (BSCF)	420	1M KOH	[1]
CQDs@BSCF-NFs	350	1M KOH	[1]
$SrCo_{0.85}Fe_{0.1}P_{0.05}O_{3-\delta}$	390	1M KOH	[2]
$LaCo_{0.2}Fe_{0.8}O_3$ (LCF)	440	1M KOH	[3]
S-LCF	360	1M KOH	[3]
$NdBaMn_2O_{5.5}$	395	1 M KOH	[4]
$LaCoO_3$	390	1 M KOH	[5]
$La_{0.5}(Ba_{0.4}Sr_{0.4}Ca_{0.2})_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$/rGO	338	1 M KOH	[6]
$Sr_3FeCoO_{7-\delta}$	426	1 M KOH	[7]
NMP-treated Sr3FeCoO7-δ	343	1 M KOH	[7]
$BaCo_{0.5-x}Fe_{0.5-x}Zr_xY_xO_{3-\delta}$(BCF(ZY)$_x$, x = 0.0−0.2)	320	1 M KOH	[8]
$K(MgMnFeCoNi)F_3$	369	1 M KOH	[9]
$LaFeO_3$	650	1 M KOH	[10]
$LaNiO_3$	460	1 M KOH	[10]
$PrCoO_3$	500	1 M KOH	[10]

Figure S1. Calibration of the Hg/HgO reference electrode. For all measurements, Hg/HgO was used as the reference electrode. The Hg/HgO calibration with respect to the reversible hydrogen electrode (RHE) was performed in the high-purity H_2 saturated electrolyte with Pt wire as the working electrode. LSV was run at a rate of 1 mV s^{-1}, and potential at zero mA current was taken to be the thermodynamic potential for hydrogen evolution reactions. So, in 1M KOH, E (RHE) = E(Hg/HgO) + 0.905.
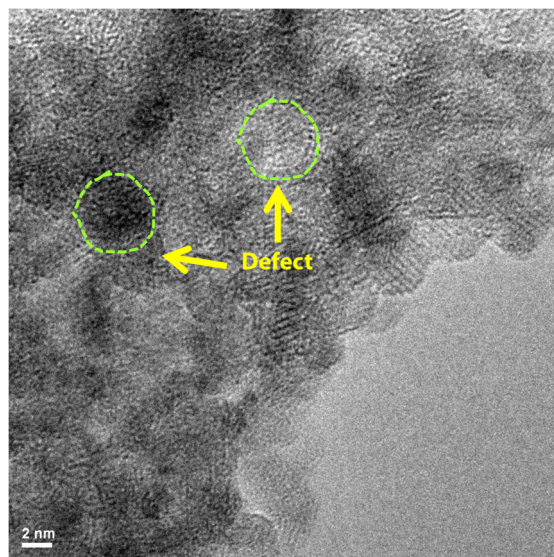
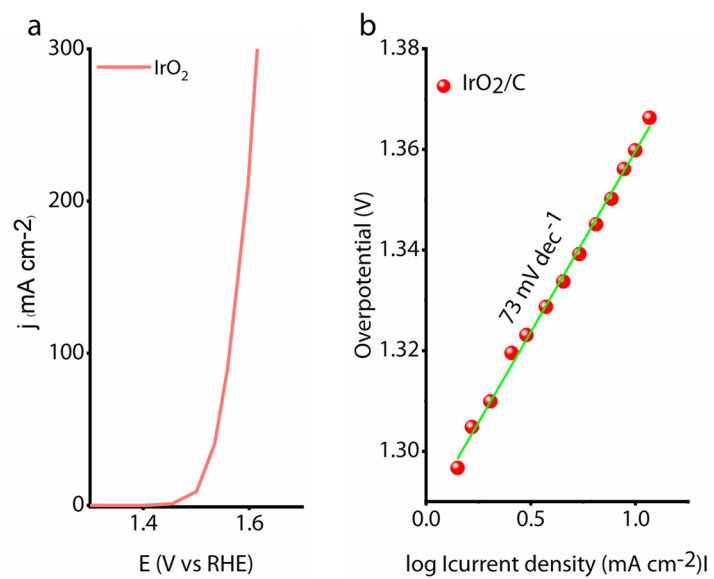**Figure S2.** TEM image showing large area defective zone in SCO-A.

Figure S3. (a) LSV polarization curve of IrO$_2$. (b) Tafel plot of IrO$_2$.
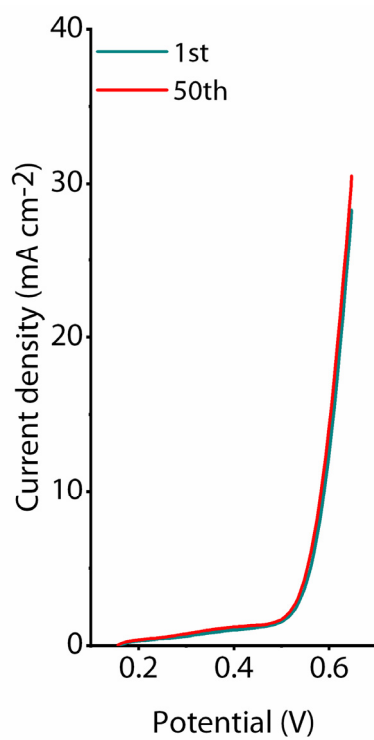
Figure S4. LSV plot showing OER performances after 1st and 50th CV cycles.

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