# Supporting Information

## Alkali Metal Doped Ruthenium Dioxide Nanosheets with Lattice Distortion as High Active Oxygen Evolution Electrocatalysts in Acidic Media

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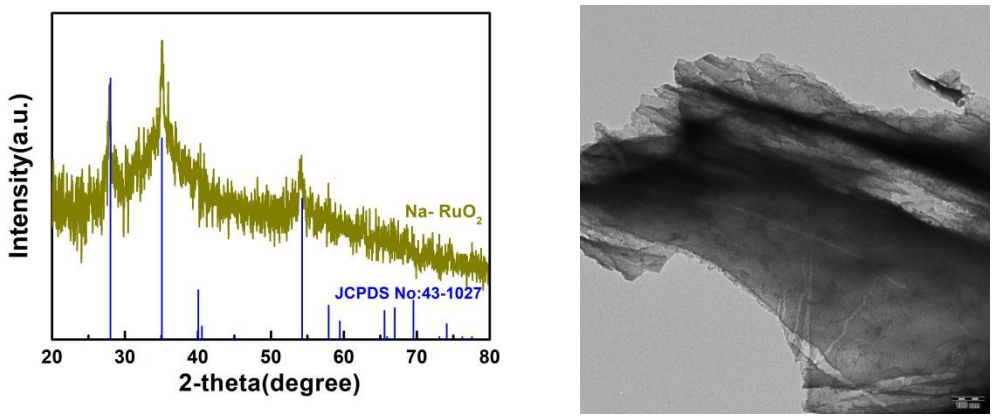


**Figure S1:** (a) XRD pattern and (b) TEM image of Na-$RuO_2$ nanosheets.

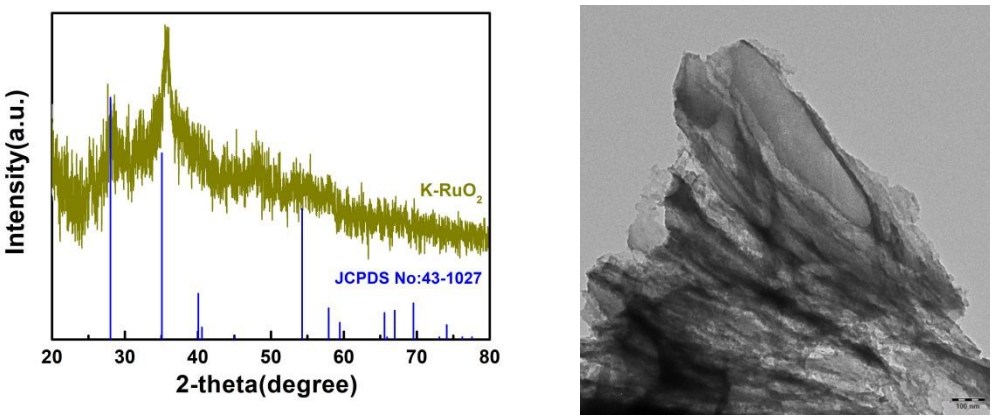


**Figure S2:** (a) XRD pattern and (b) TEM image of K-$RuO_2$ nanosheets.

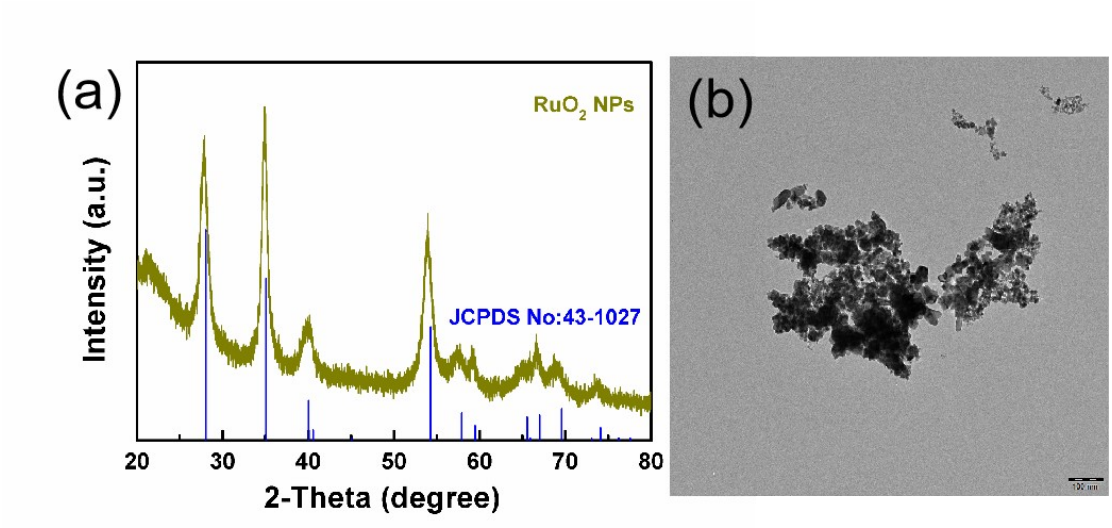


**Figure S3:** (a) XRD pattern and (b) TEM image of $RuO_2$ NPs.

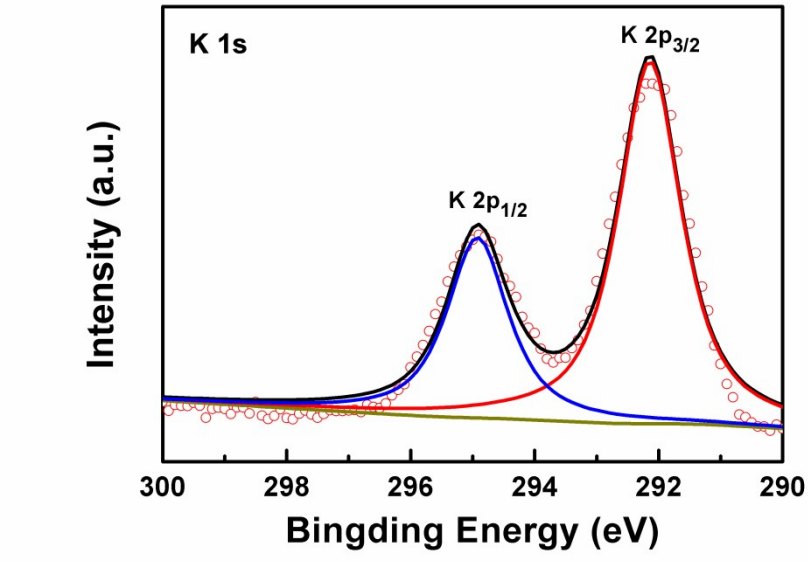


**Figure S4:** The high-resolution XPS spectra of K 2p of K doped $RuO_2$ NSs.

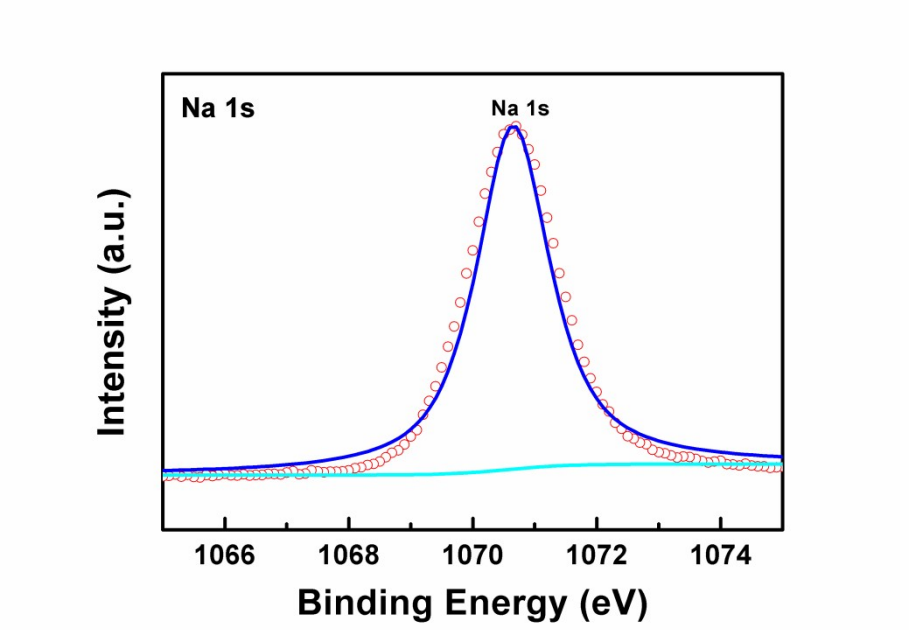


**Figure S5:** The high-resolution XPS spectra of Na 1s of Na doped $RuO_2$ NSs.

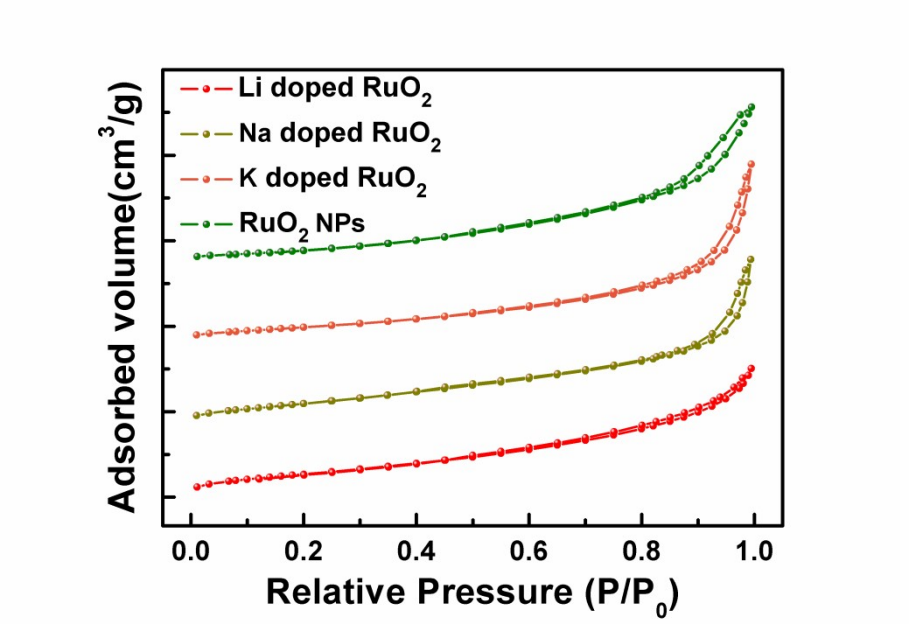


**Figure S6:** $N_2$ adsorption-desorption isotherms of Li doped $RuO_2$ NSs, K doped $RuO_2$ NSs, Na doped $RuO_2$ NSs and pristine $RuO_2$ NPs.

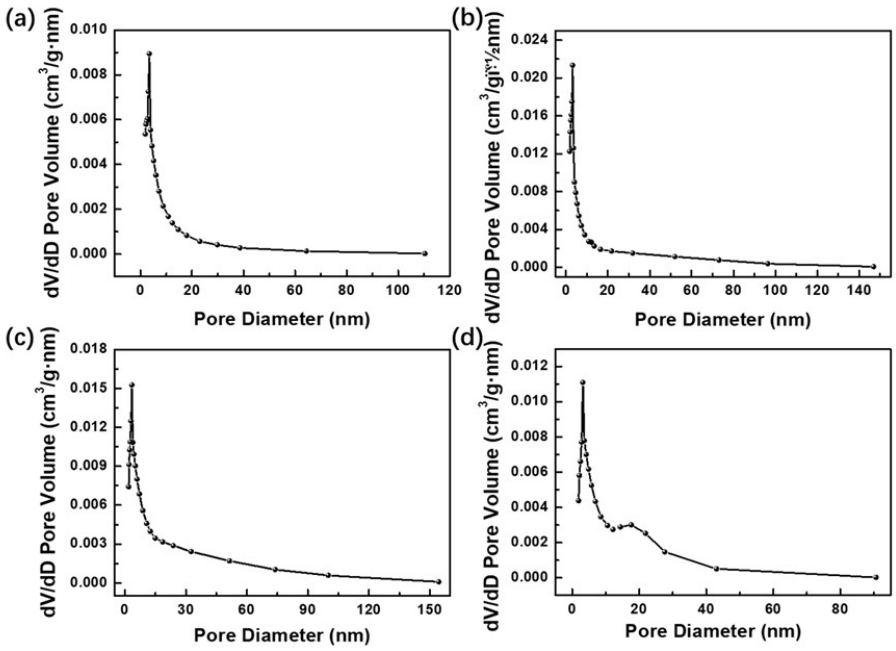


**Figure S7:** Pore size distribution curves of (a) Li doped $RuO_2$ NSs, (b) K doped $RuO_2$ NSs, (c) Na doped $RuO_2$ NSs, (d) pristine $RuO_2$ NPs.

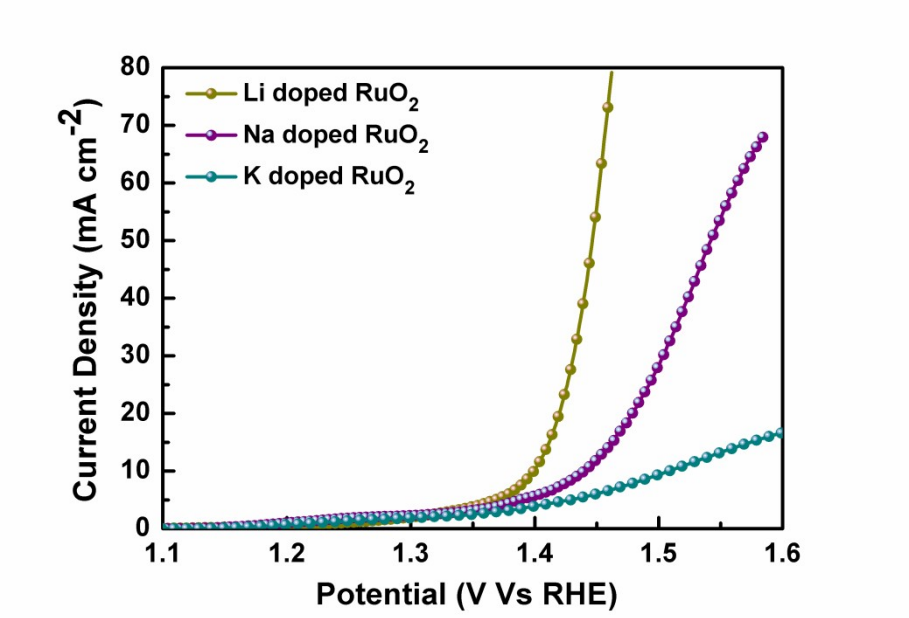


**Figure S8.** LSV curve of Li doped $RuO_2$ NSs, K doped $RuO_2$ NSs, Na doped $RuO_2$ NSs.

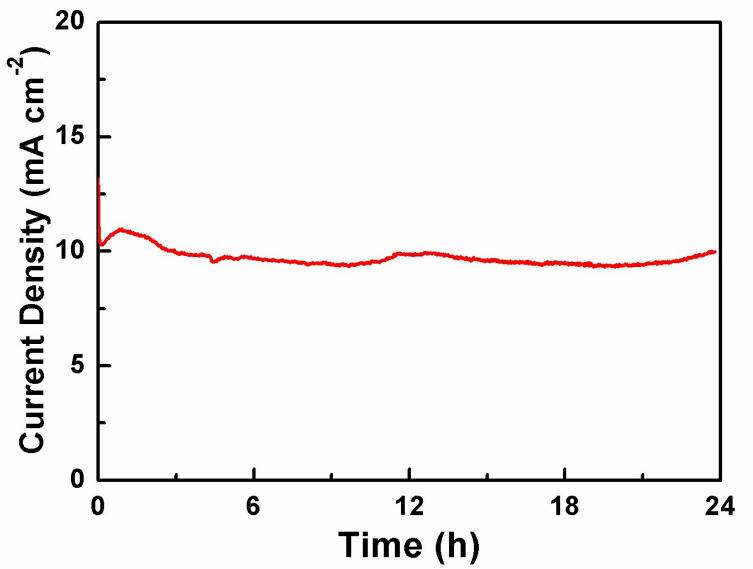


**Figure S9.** The chronoamperometry curves of the Li-doped $RuO_2$ nanosheets electrode.

**Table S1.** Atom% of Li in $RuO_2$ sample.

| Elements | EDS results |
|---|---|
| Li | 6.18 |

**Table S2.** Comparisons of OER performance for some Ru based electrocatalysts in acid condition.

| Catalyst | Electrolyte | Overpotential[mV] at 10 mA $cm^{-2}$ | Ref. |
|---|---|---|---|
| $RuO_2/(CoMn)_3O_4$/CC | 0.5 M $H_2SO_4$ | 270 mV | 1 |
| $RuNi_2$@G-250 | 0.5 M $H_2SO_4$ | 227 mV | 2 |
| $Nd_{0.1}RuO_x$/CC | 0.5 M $H_2SO_4$ | 211 mV | 3 |
| Ru/$Mo_2C$ | 0.5 M $H_2SO_4$ | 215 mV | 4 |
| Ru@V-$RuO_2$/C HMS | 0.5 M $H_2SO_4$ | 176 mV | 5 |
| Si-$RuO_x$@C | 0.5 M $H_2SO_4$ | 220 mV | 6 |
| Co-RuIr nanocrystals | 0.1 M $HClO_4$ | 235 mV | 7 |
| a-$RuTe_2$ PNRs | 0.5 M $H_2SO_4$ | 245 mV | 8 |
| RuCu nanosheet | 0.5 M $H_2SO_4$ | 236 mV | 9 |
| Ru nanosheet | 0.5 M $H_2SO_4$ | 260 mV | 10 |
| $Cr_{0.6}Ru_{0.4}O_2$ | 0.5 M $H_2SO_4$ | 178 mV | 11 |
| Ultrafine defective $RuO_2$ | 0.5 M $H_2SO_4$ | 179 mV | 12 |
| Cu-doped $RuO_2$ | 0.5 M $H_2SO_4$ | 188 mV | 13 |
| Co-doped $RuO_2$ NWs | 0.5 M $H_2SO_4$ | 200 mV | 14 |
| $NaRuO_2$ NSs | 0.1 M $HClO_4$ | 255 mV | 15 |
| Ru@FLC | 0.5 M $H_2SO_4$ | 258 mV | 16 |
| $RuO_2$ NWs | 0.5 M $H_2SO_4$ | 234 mV | 17 |
| Li-$RuO_2$ NSs | 0.5 M $H_2SO_4$ | 169 mV | This work |

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