

## Supplementary information

### Creating compressive stress at the NiOOH/NiO interface for water oxidation

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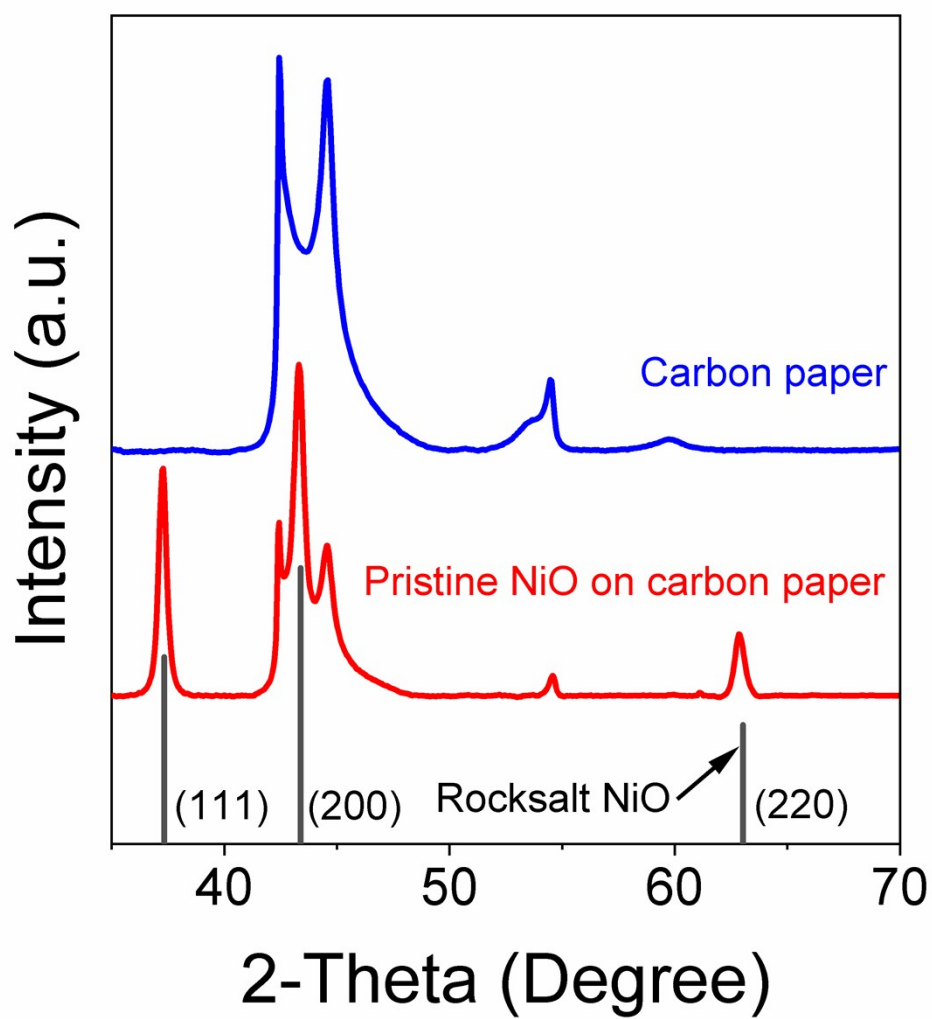


Fig. S1 Synchrotron X-ray diffraction pattern for the as-prepared NiO. The samples are dispersed on a carbon paper. The XRD pattern clearly indicates that the as-prepared NiO is rocksalt-phase NiO.

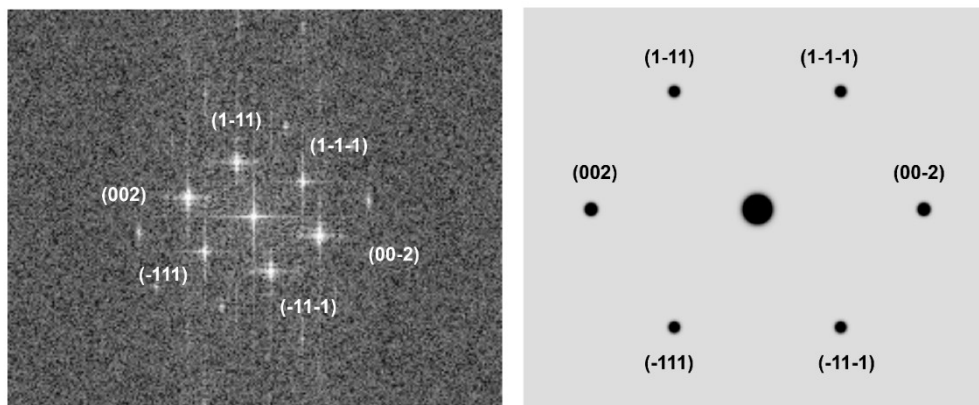


Fig. S2 a) Fast Fourier transform (FFT) pattern of the high resolution STEM image. b) The simulated electron diffraction pattern of rocksalt NiO along [111] zone axis. By comparing the FFT pattern with the simulated pattern, we can conclude that the exposed surface of the NiO nanosheet is (111).

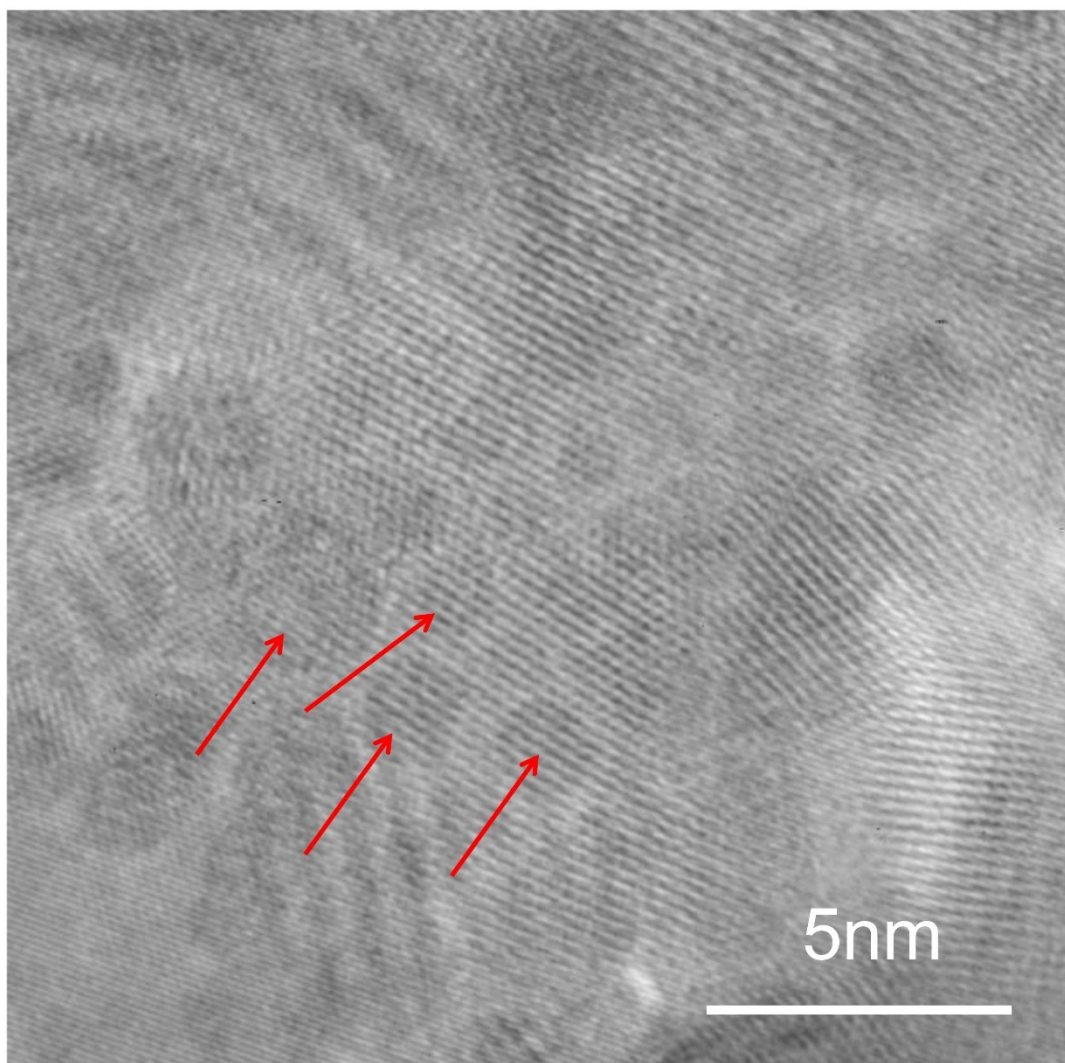


Fig. S3 HRTEM for the sodiated sample after the CA test. Crystalline particles (particles indicated by the arrow) formed at the surface after the CA test. It is likely that the crystalline particles are directly transformed from the Ni nanoparticles formed in the sodiation process.

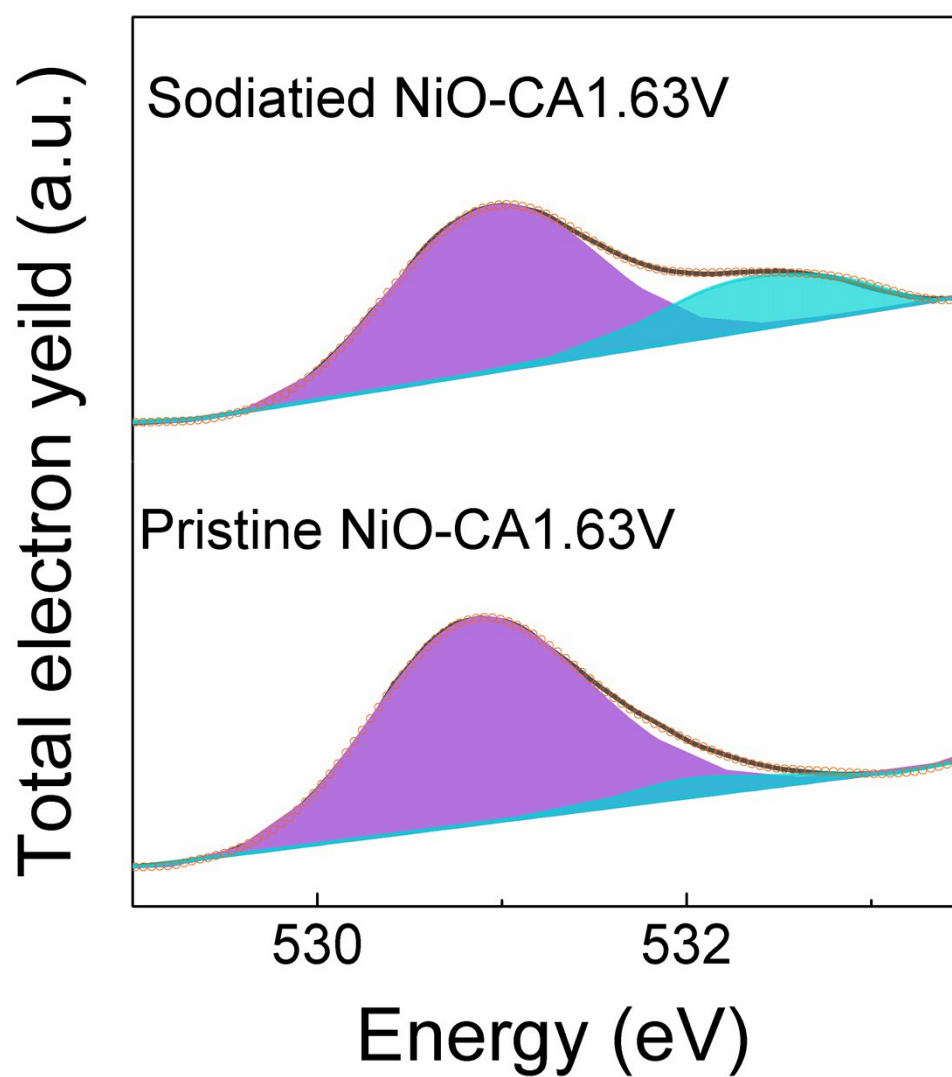


Fig. S4 Deconvolution for the pre-edge peak of the O K-edge after OER test.

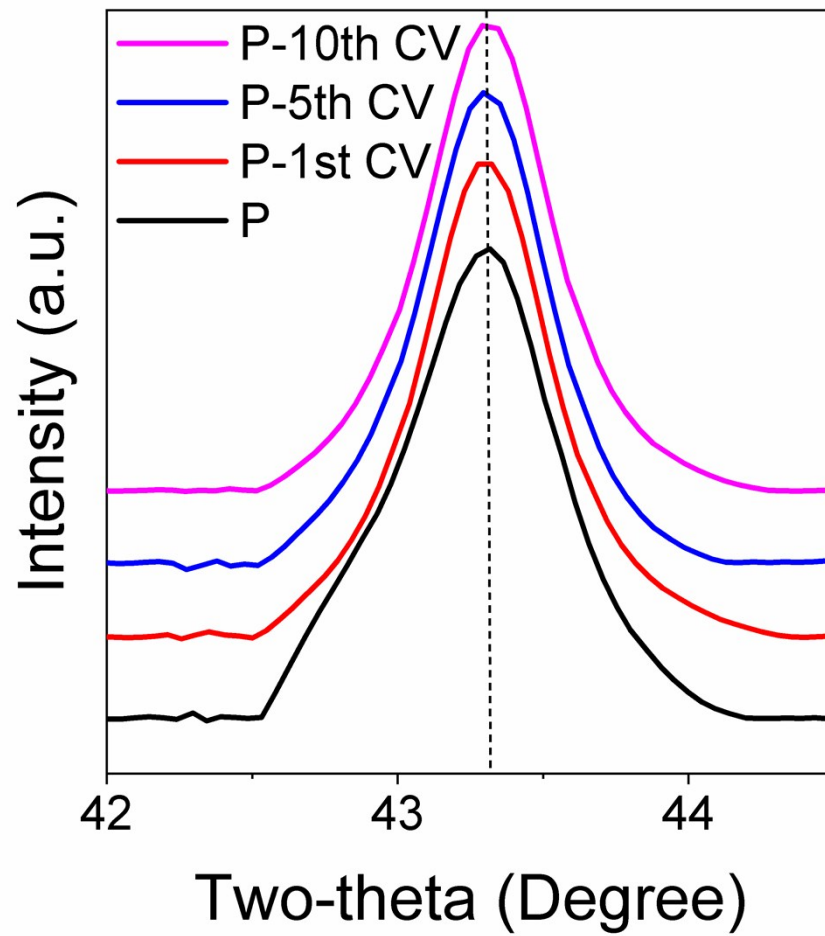


Fig. S5 (200) peak position shift for the pristine NiO sample at different CV cycles. The positions for all of the peaks do not change after the CV test.