Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Electronic Supplementary Information

High Surface Area MnO_2 Nanomaterials Synthesized by Selective Cation Dissolution for Efficient Water Oxidation

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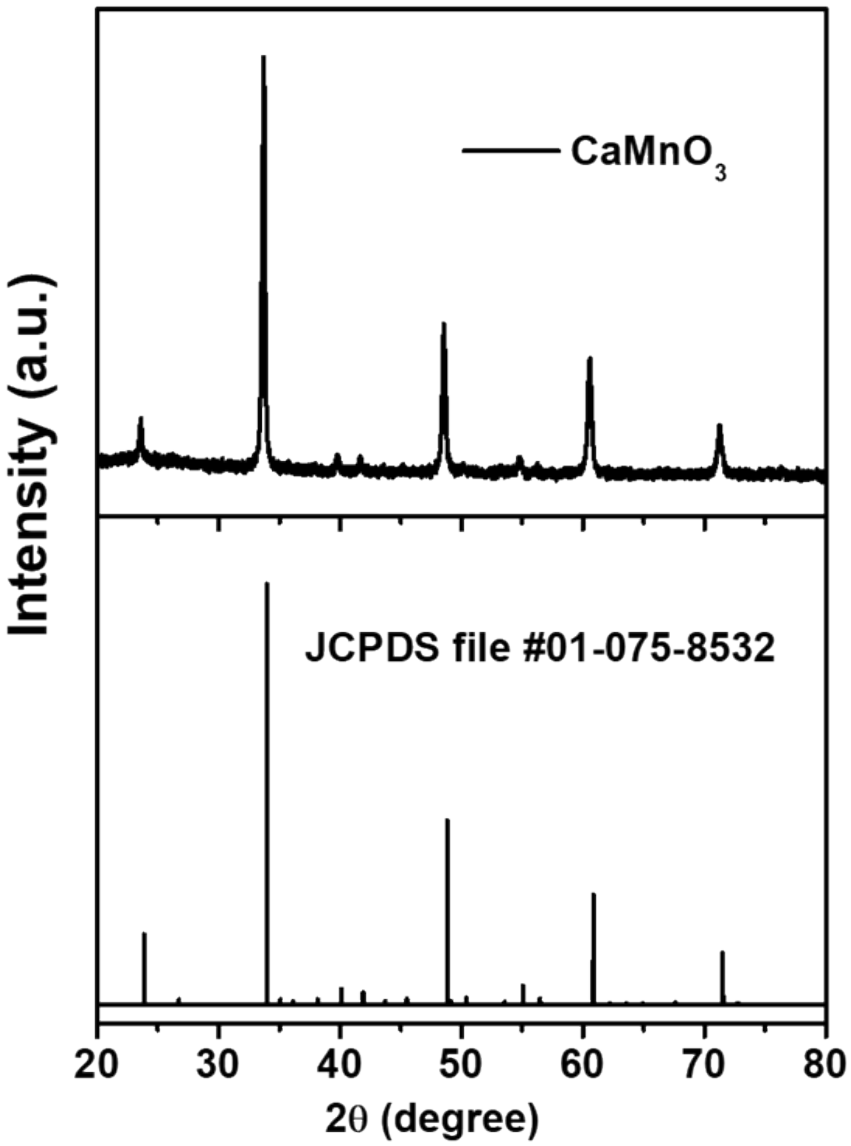

Figure S1. XRD pattern of $CaMnO_3$ (CMO) along with standard JCPDS file #01-075-8532

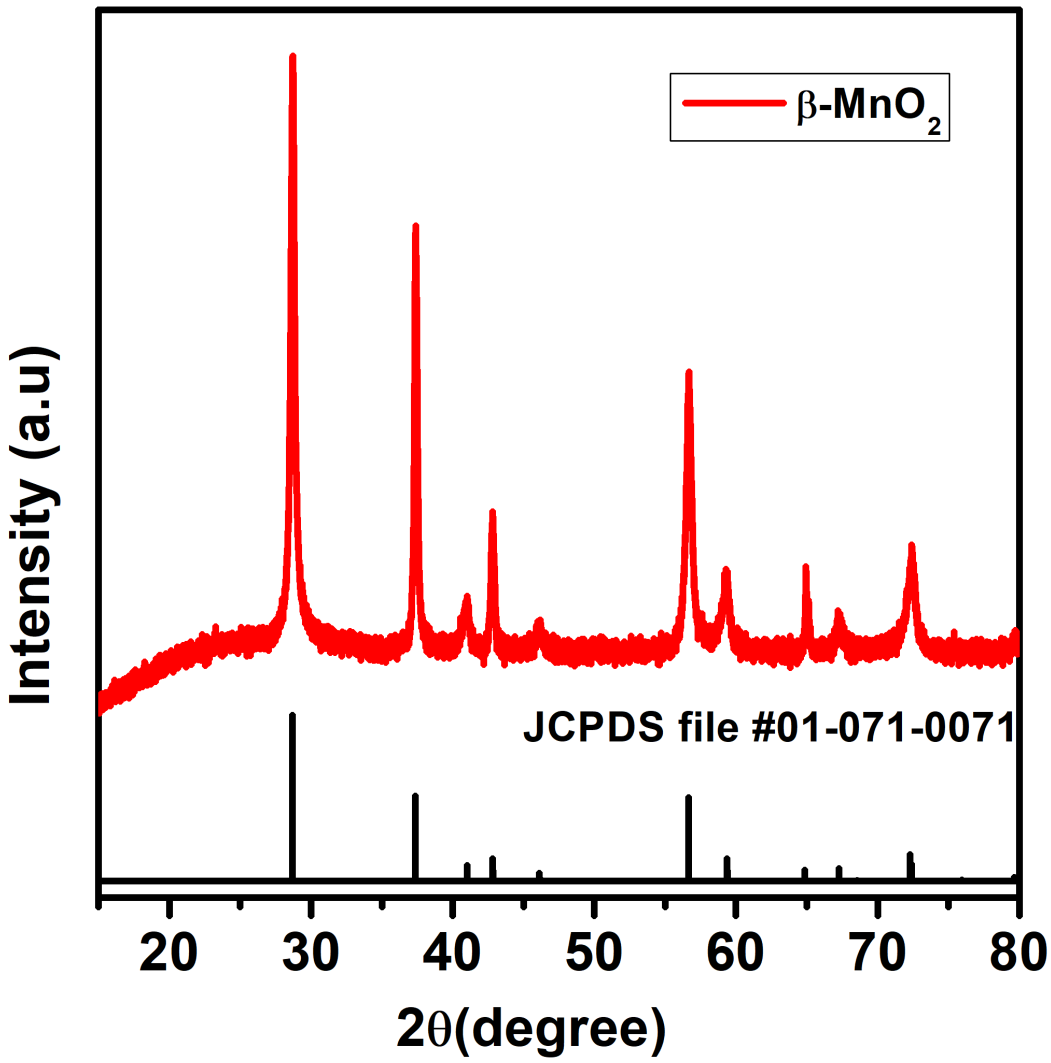

Figure S2. The XRD pattern of Nano β-MnO_2 indexed with the standard JCPDS file # 01-071-0071.

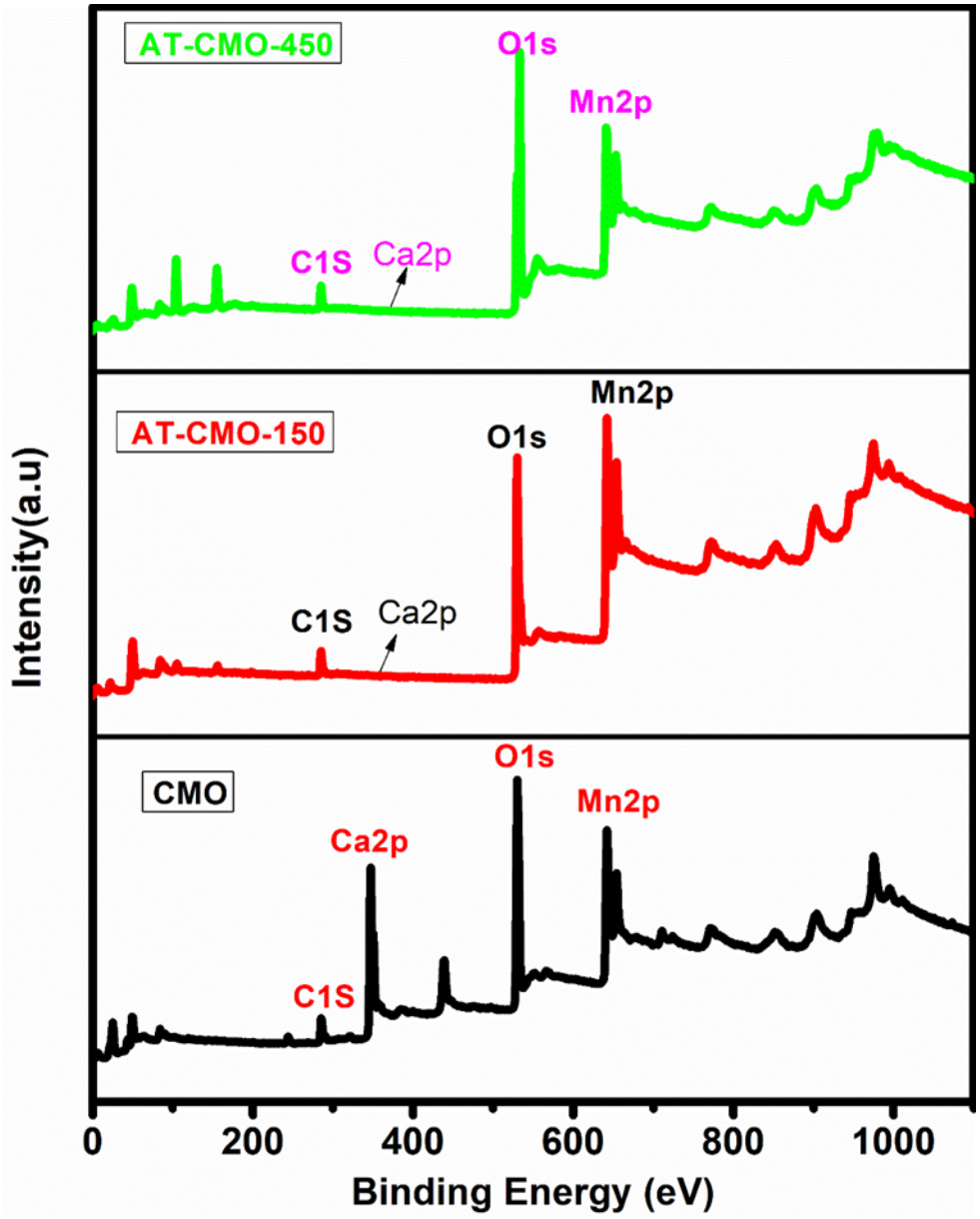

Figure S3. XPS survey scan of CMO , AT-CMO-150, and AT-CMO-450

Table S1 Elemental analysis of CMO, AT-CMO-150, and AT-CMO-450 examined by XPS

AT-CMO-450

Name	Peak BE	FWHM eV	Area(P)CPS.eV	Atomic %	Q
O1s	533.35	1.61	430907.49	70.1	1
Mn2p	641.34	3.2	410035.7	17.03	1
C1s	284.96	1.71	32602.73	12.81	1
Ca2p	351.04	0	928.69	0.06	1

AT-CMO-150

Name	Peak BE	FWHM eV	Area(P) CPS.eV	Atomic %	Q
O1s	530.08	3.05	1828728.15	57.13	1
Mn2p	642.26	3.85	3210457.65	25.68	1
C1s	285.15	3.2	227136.57	17.18	1
Ca2p	350.08	0	695.25	0.01	1

CMO

Name	Peak BE	FWHM eV	Area (P) CPS.eV	Atomic %	Q
O1s	529.88	2	502955.42	52.82	1
Ca2p	346.43	2.13	413209.67	18.32	1
Mn2p	641.81	3.12	547161.08	14.71	1
C1s	285.06	1.92	55596.81	14.14	1

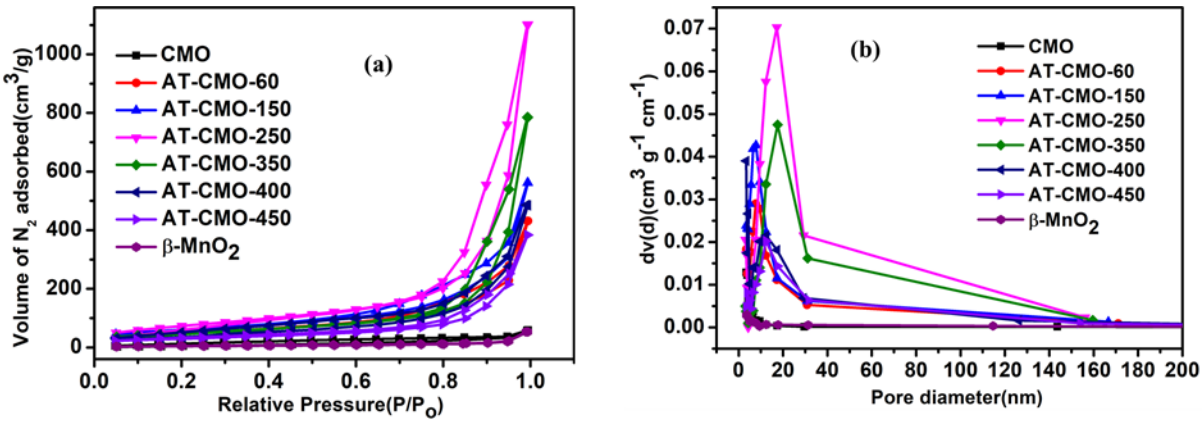

Figure S4 . (a) Nitrogen adsorption-desorption isotherm and (b) BJH desorption pore size distribution of synthesized catalysts.

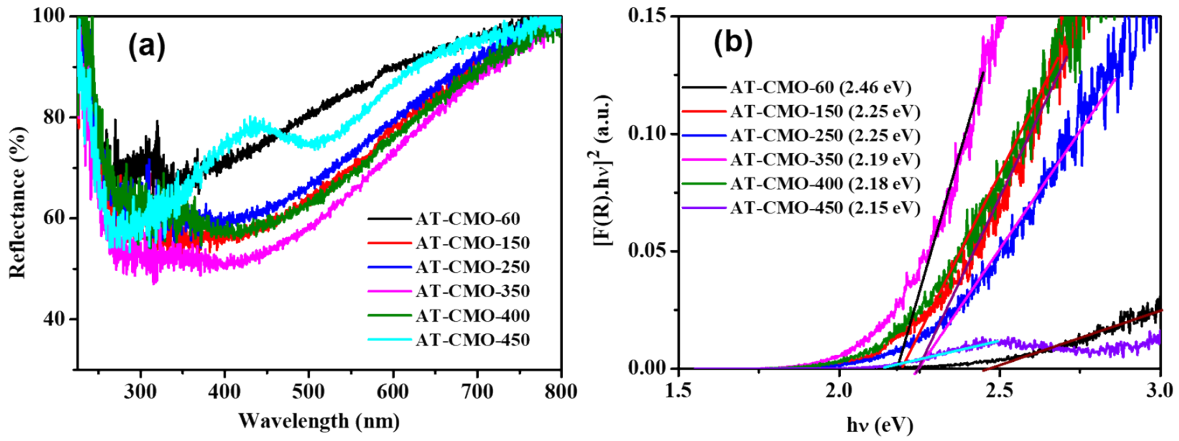

Figure S5 : (a) The reflectance spectra of the catalysts and (b) Tauc plot of the catalysts

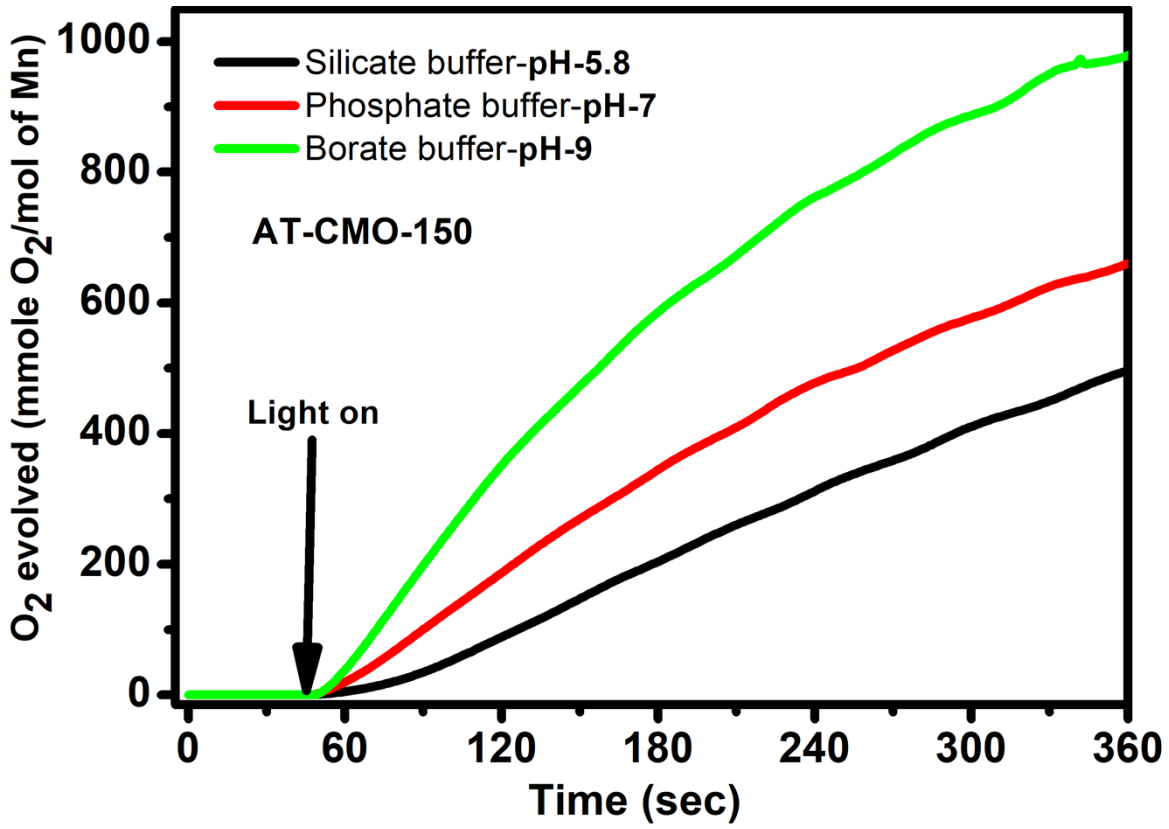

Figure S6: The photochemical water oxidation activity of AT-CMO-150 in silicate buffer-pH-5.8, phosphate buffer-pH-7, and borate buffer-pH-9

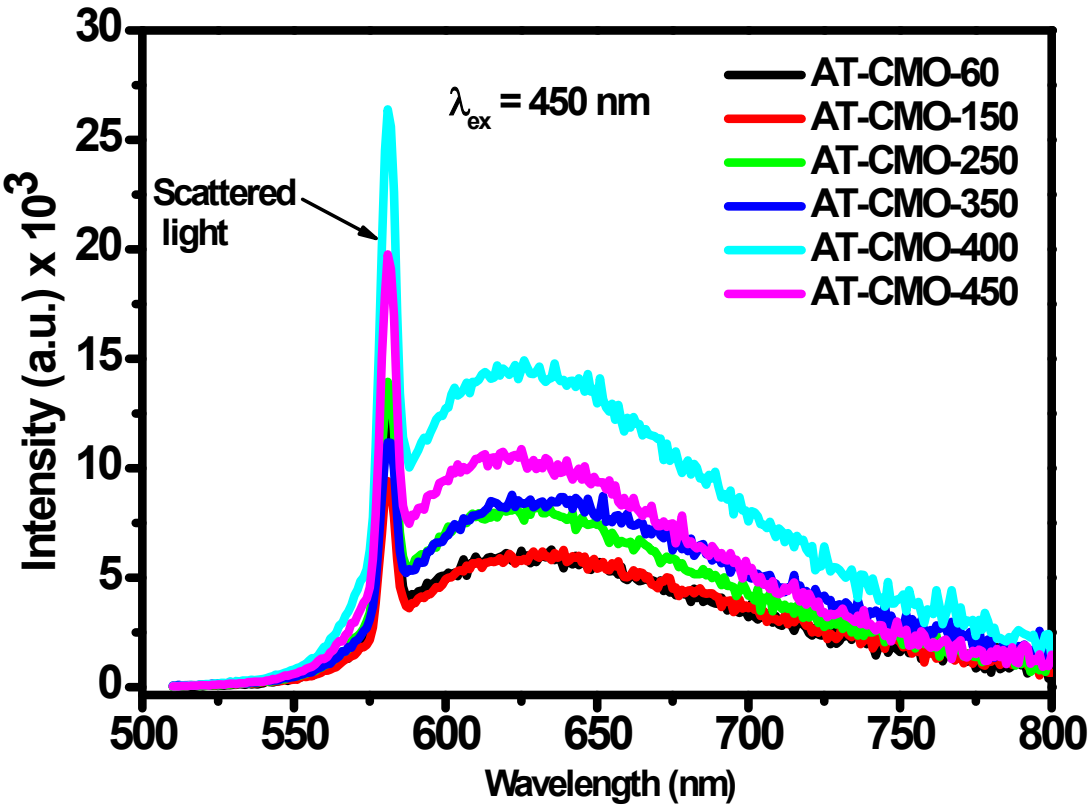

Figure S7: Photoluminescence spectra of reaction mixtures at 450 nm excitation wavelength

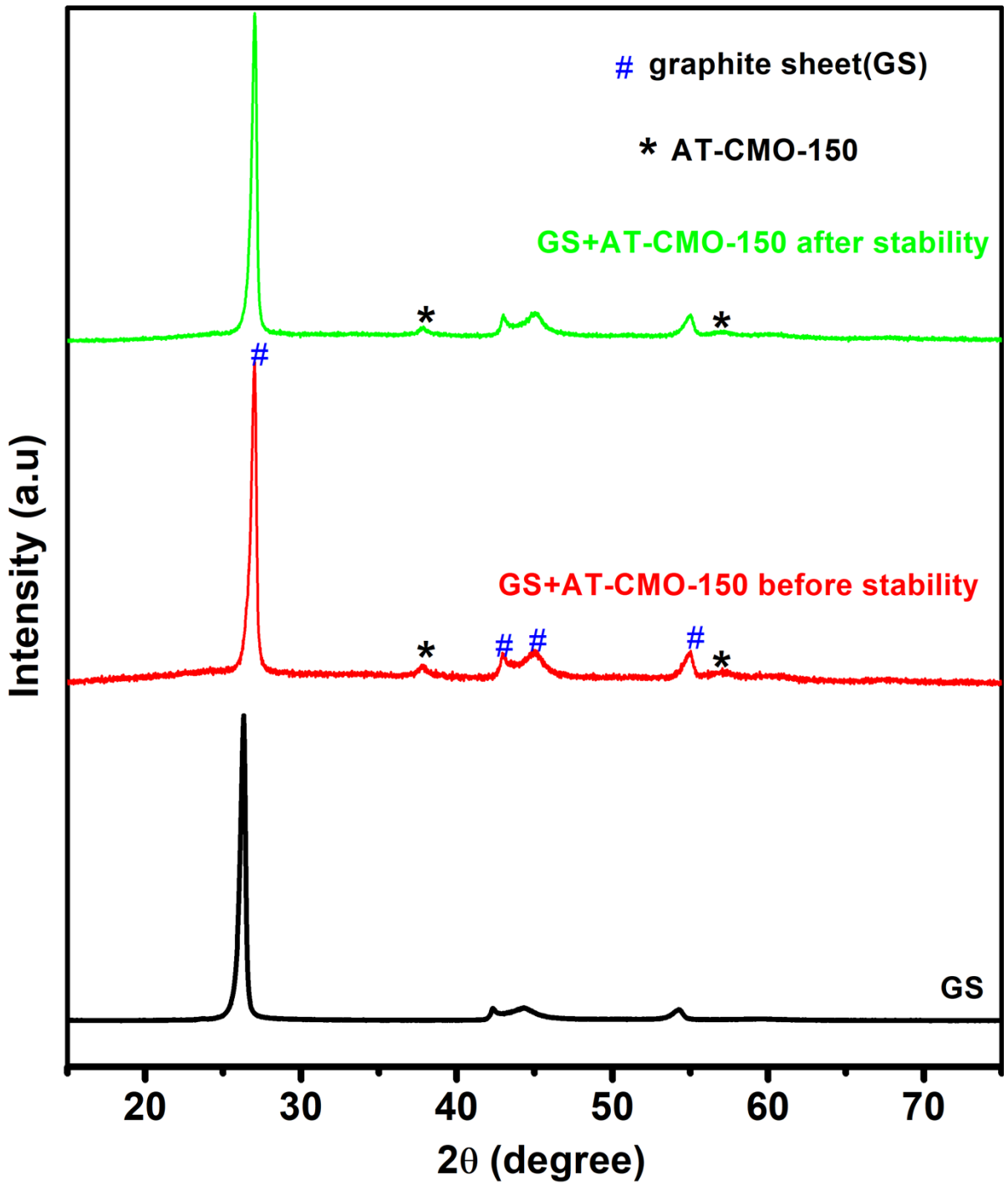

Figure S8: The XRD pattern of graphite sheet, AT-CMO-150 coated on graphite sheet before and after the electrochemical water oxidation reaction stability

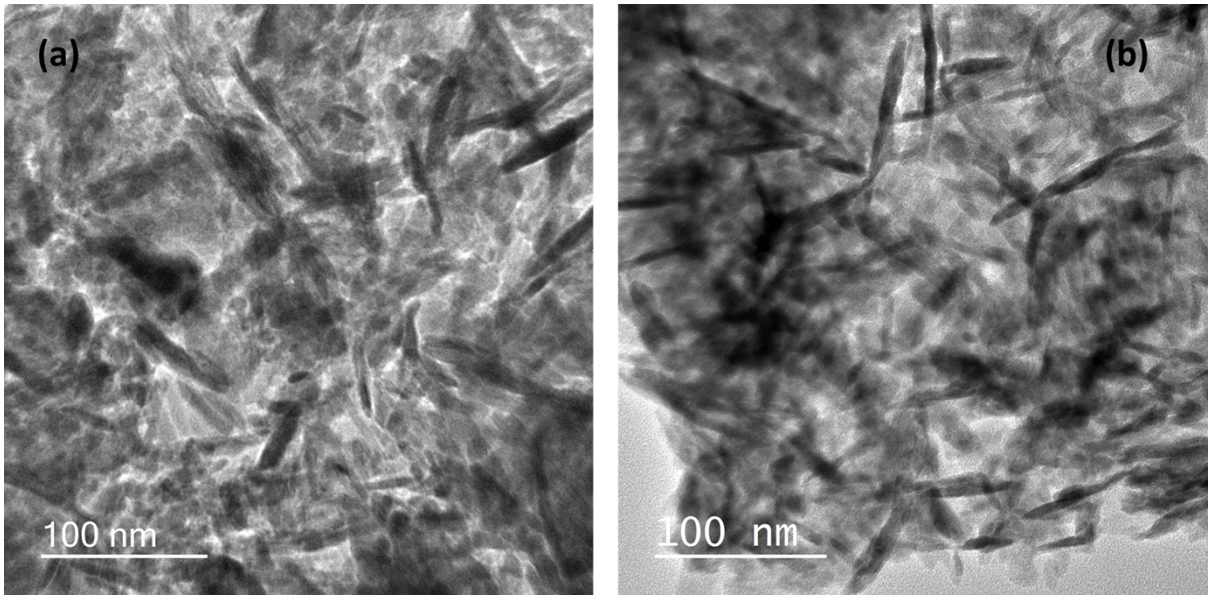

Figure S9: TEM images of AT-CMO-150 (a) before and (b) after the electrochemical water oxidation reaction stability