Supporting Information

Engineering g-C_3N_5/$MnCo_2S_4$ Heterojunction Nanocomposites for Highly Efficient Visible-Light Photocatalytic Dye Degradation and Electrochemical Energy Conversion

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S1. Instrumentation

A powder X-ray diffractometer was employed to investigate the crystallinity and phase composition of the synthesized materials (P-XRD) (ARL EQUINOX300, Cu-Kα, 1.5406 Å), while Fourier transform infrared (FT-IR) spectroscopy (Jasco FT/IR-4600, KBr pellet method) identified the functional groups. Raman spectroscopy (Renishaw, UK, Model no: 2CCN98) was used to perform the Raman analysis. The morphology and elemental composition were characterized by field emission scanning electron microscope (FE-SEM) (JEOL-JSM-7610F) and high-resolution transmission electron microscope (HR-TEM) (JEOL-JEM-2100 Plus) with energy-dispersive X-ray spectroscope (EDS). The X-ray photoelectron spectrometer (XPS) (K-Alpha-PHI 5000 Versaprobe III) was used to determine chemical states, and optical properties were analysed using UV-visible diffuse reflectance spectrometer (UV-Vis DRS) (Shimadzu UV-2600) and a single-beam UV-vis spectrophotometer (LMSPUV1900). The average surface area, pore size and volume were found using Brunauer-Emmett-

Teller (BET) (Autosorb iQ Station 1) instrument. The electrochemical experiments were conducted using a Bio-logic SAS (model number: SP-50e/150e) electrochemical instrument.

Figure S1. Raman spectrum of GCN/MCS composite.

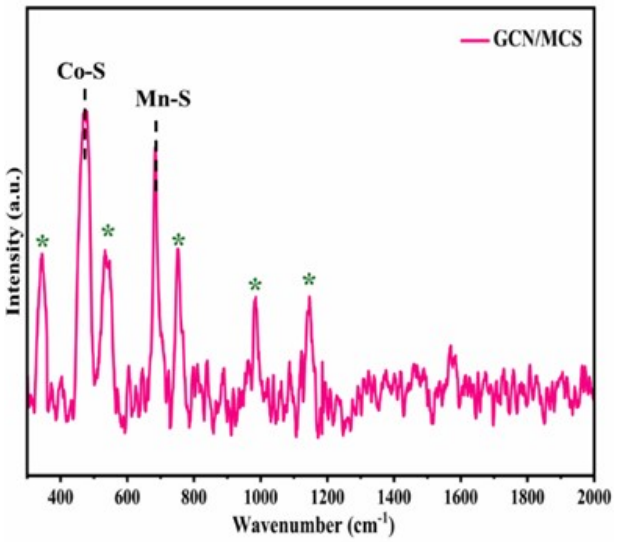

Table ST1. Surface area, average pore volume and pore diameter calculated from N_2 adsorption /desorption isotherm.

Materials	Surface area ($m^2 g^{-1}$)	Average Pore volume ($cm^3 g^{-1}$)	Average Pore diameter (nm)
GCN	7.72	0.067	36.5
MCS	9.00	0.035	15.78
GCN/MCS	21.88	0.107	19.66

Figure S2. VB-XPS spectra of a) GCN and b) MCS.

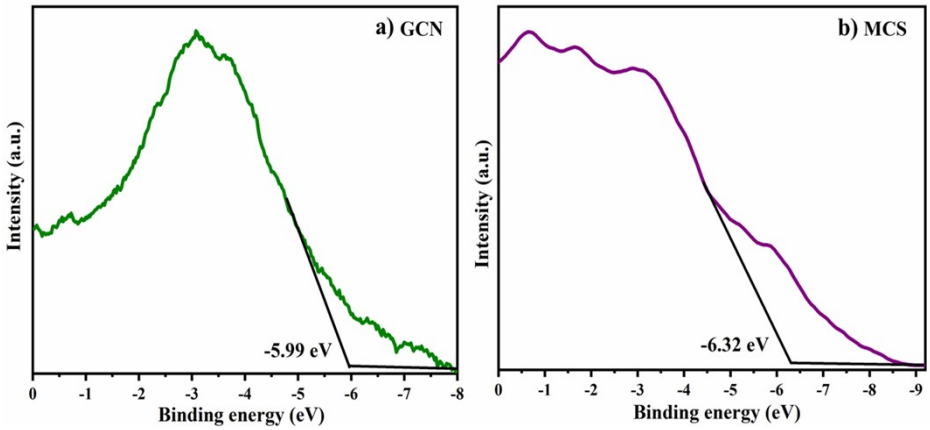

Figure S3. ESCA (a-c) and Cdl (d-f) plots for HER.

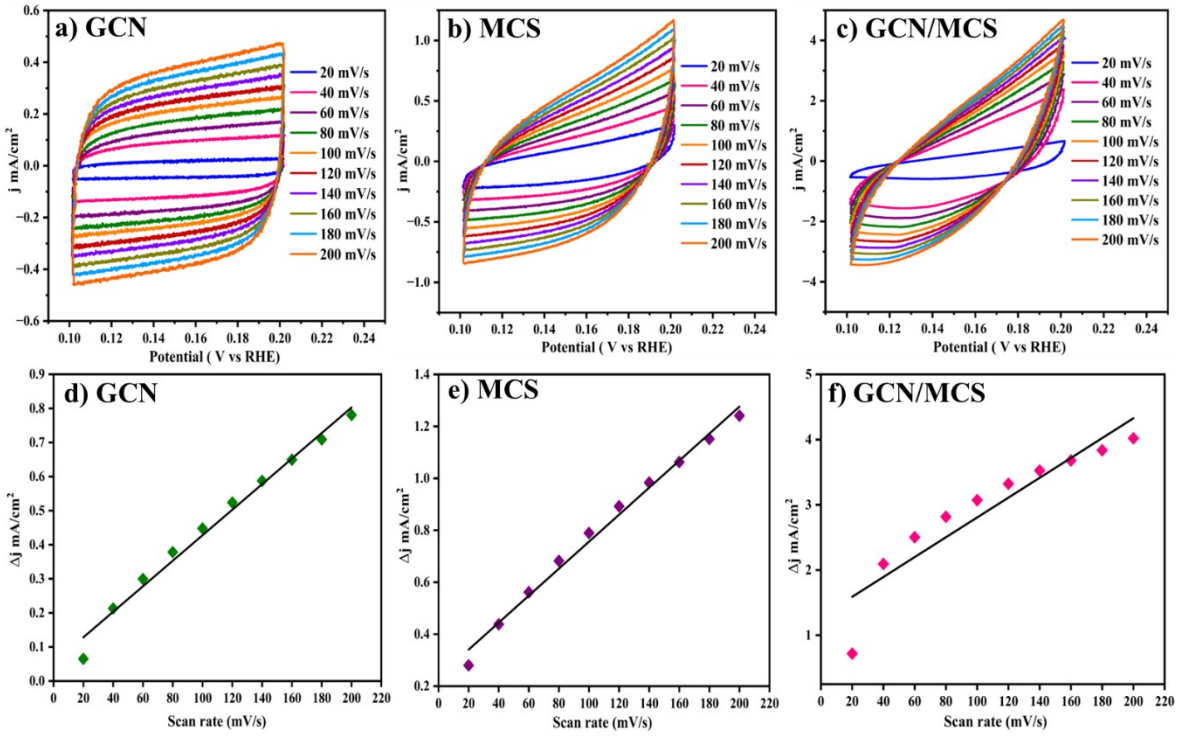

Figure S4. ESCA (a-c) and Cdl (d-f) plots for OER.

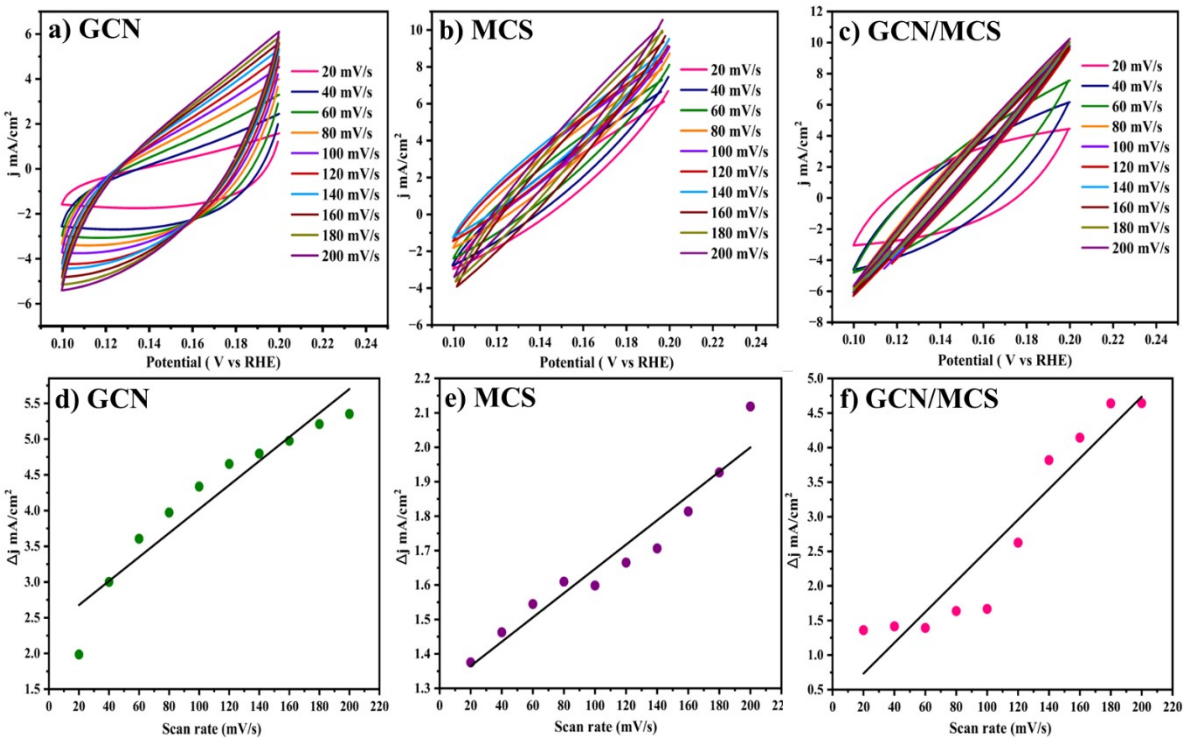

Figure S5. a) XRD and FE-SEM analyses (b & c) of the prepared nanocomposite before and after the electrocatalytic activity.