

Electronic Supplementary Information

Microstructural, optical, and impedance studies of porous Mn- α -Fe₂O₃/CuO/Ag heterostructures grown using solution-based methods

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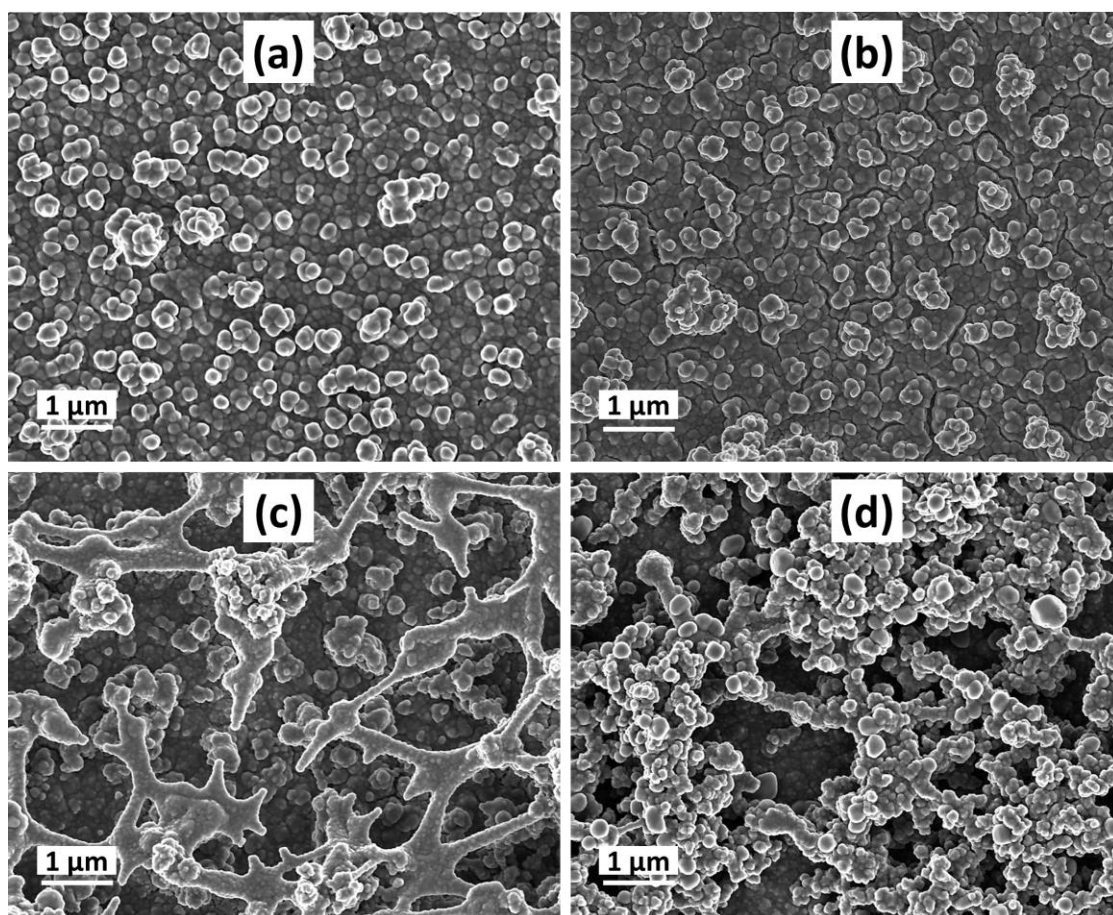


Fig. S1. The SEM micrographs a lower magnification for (a) pristine α -Fe₂O₃, (b) Mn-doped α -Fe₂O₃, (c) α -Fe₂O₃/CuO, and (d) α -Fe₂O₃/CuO/Ag films.

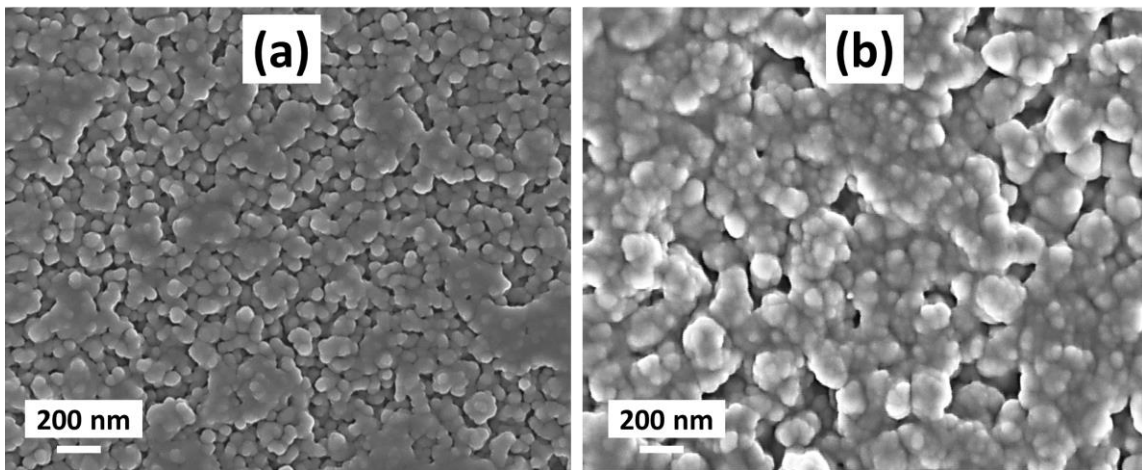


Fig. S2. SEM micrographs of (a) CuO-1d films prepared using 1-day-old Cu acetate precursors and (b) CuO-1d/Ag NPs samples.

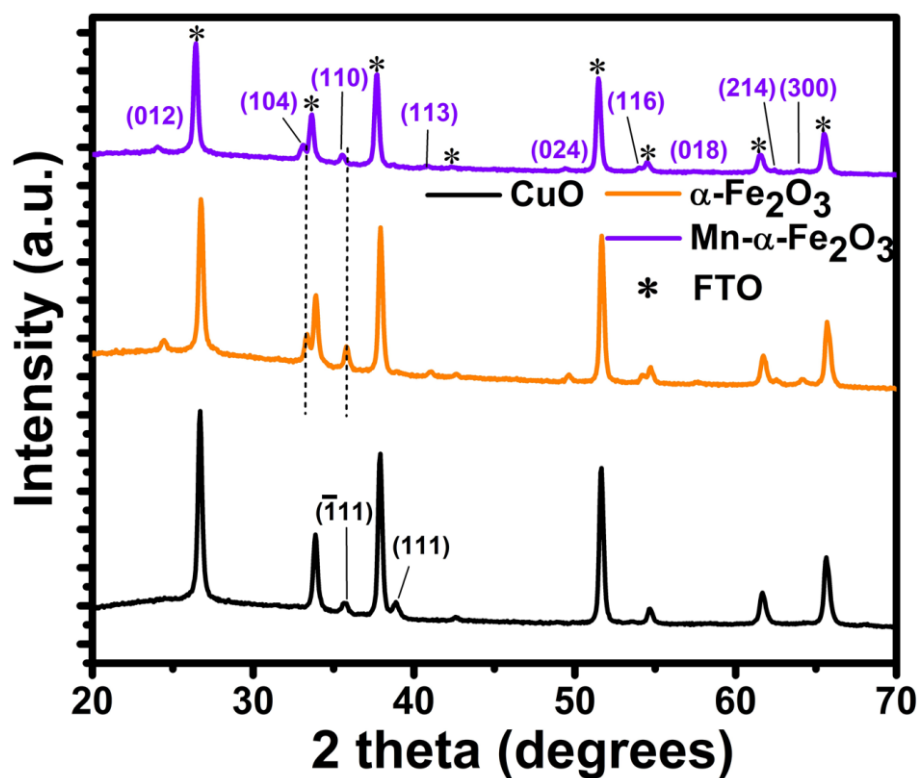


Fig. S3. The XRD pattern of pristine CuO, α -Fe₂O₃, and Mn- α -Fe₂O₃ samples.

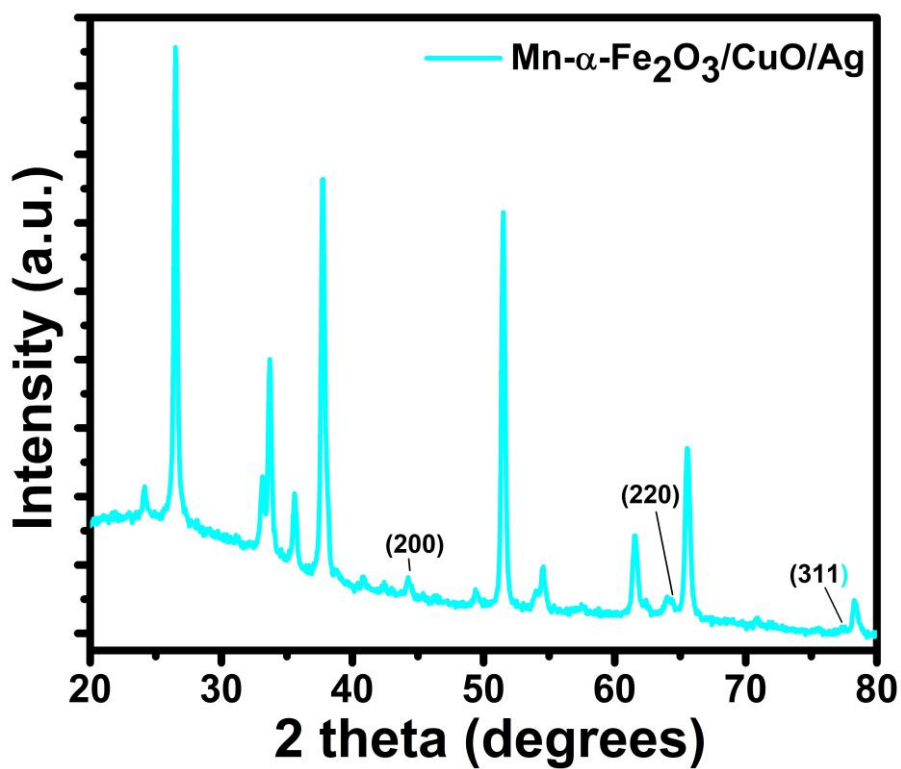


Fig. S4. An expanded view of the XRD pattern of Mn- α -Fe₂O₃/CuO/Ag heterostructure where the characteristic peaks for Ag are more clearly identified.

Table S1. The crystal size, dislocation density, and microstrain of the α -Fe₂O₃ and Mn- α -Fe₂O₃ CuO, and metallic Ag films.

Sample	Bragg angle (2θ)	FWHM (degrees)	Crystal size (nm)	Strain ϵ x 10⁻³	Dislocation density ρ x 10¹⁵ Lin/m²
α-Fe₂O₃	35.811	0.300	27.9	4.06	1.29
Mn-α-Fe₂O₃	35.548	0.325	25.7	4.39	1.51
CuO	35.687	0.407	20.5	5.50	2.37
Ag	44.278	0.458	18.7	6.20	2.85