

Research title

## Z-Scheme Poly-vinyl alcohol Aided of Multiphase ZnO-AgI-CuO nanocomposite as efficient Photocatalyst for Dye photo-degradation

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### Supporting information

samples	2θ	θ	(hkl)	d-spacing	a	c
ZnO	31.91	15.97	(002)	2.811	3.349	5.207
	34.56	17.28	(100)	2.595	3.263	5.196
	36.39	18.19	(101)	2.474	3.168	5.211
	47.68	23.84	(110)	1.914	3.248	5.196
ZnO-AgI-CuO	31.84	15.91	(002)	2.808	3.354	5.212
	34.51	17.27	(100)	2.598	3.266	5.199
	36.33	18.16	(101)	2.479	3.172	5.206
	47.62	23.81	(110)	1.916	3.250	5.199

**Table S1** unit cell parameters

### Average crystallite sizes obtained from XRD

**Table S2)** 2θ values of major peaks, FWHM, Intensity, and Average particle sizes of ZnO and PVA-ZnO-CuO-AgI catalysts

Sample: ZnO				Sample: PVA-supported ZnO-CuO-AgI			
2θ	FWHM	Intensity	Average size (nm)	2θ	FWHM	Intensity	Average size (nm)
36.39	0.21200	5686	44	36.33	0.39640	1039	24
34.56	0.16150	2837		34.54	0.37870	614	
31.91	0.24370	3301		31.84	0.35430	547	

**Table S3)** 2θ values of major peaks FWHM, Intensity, and Average particle sizes of CuO and AgI nanoparticles.

Sample: CuO				Sample: AgI			
2θ	FWHM	Intensity	Average size (nm)	2θ	FWHM	Intensity	Average size (nm)
48.84	0.318	880	29	39.31	0.13430	517	66
38.87	0.329	3177		23.81	0.15010	503	
35.61	0.294	3344		22.45	0.15180	389	

## BET results

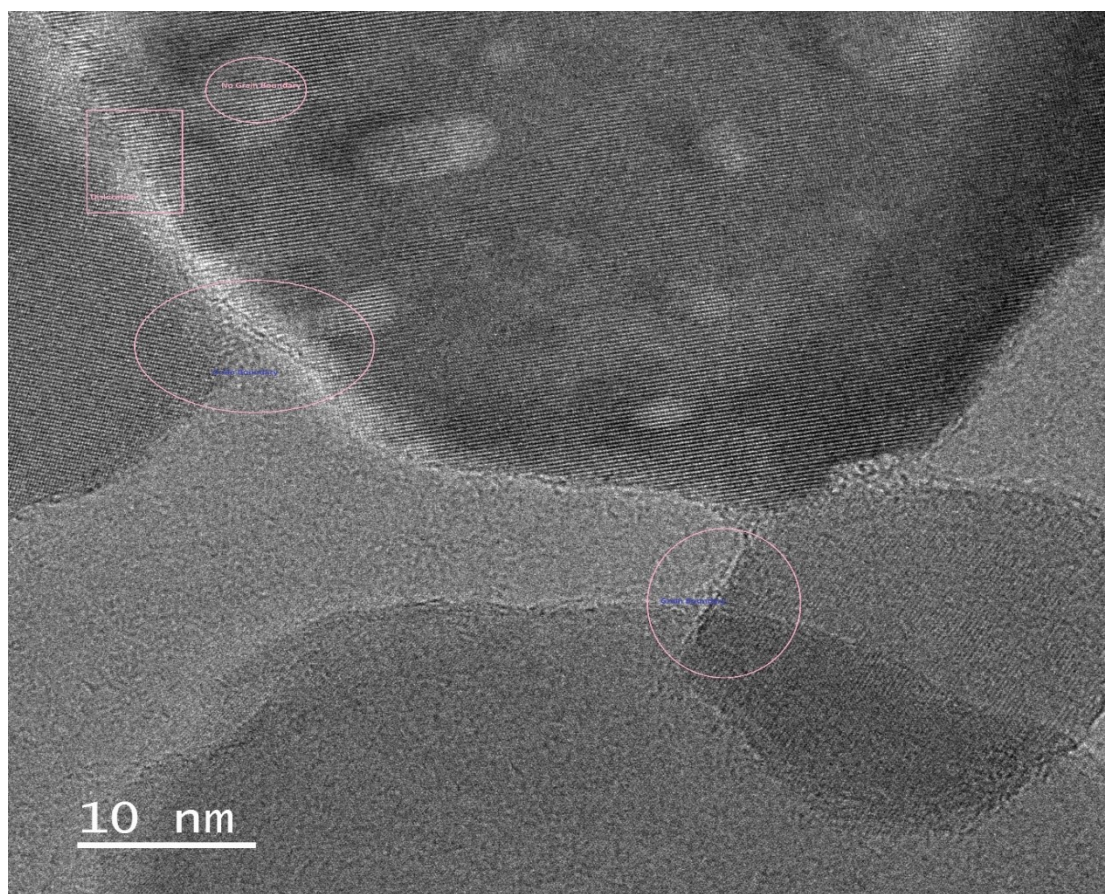
**Table S4)** surface area, mean pore diameter, and pore volume of ZnO, CuO, AgI, and PVA-ZnO-CuO- AgI nanomaterials.

Photocatalyst	Surface area (m <sup>2</sup> /g)	Mean pore diameter (nm)	Total pore volume (cm <sup>3</sup> /g)
ZnO	4.18	11.54	0.0171
AgI	12.31	14.46	0.0312
CuO	15.01	16.32	0.0511
PVA-ZnO-CuO-AgI	46.11	32.25	0.3102

## Band gap and band position for each semiconductor.

**Table (S5)** Absolute electronegativity of the semiconductor ( $\chi$ ), band gap ( $E_g$ ) value, redox potential band edges of VB and CB of the semiconductors

Sample	$\chi$ (eV)	$E_g$ (eV)	EVB	ECB
ZnO	5.79	3.25	2.915	-0.335
CuO	5.82	1.98	2.31	0.33
AgI	5.48	2.67	2.315	-0.355
ZnO-CuO-AgI	-	2.13	-	-



**Fig. S1** HR-TEM of AgI-ZnO-CuO nanocomposite