Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Dissimilitude behaviour of Cu_2O nano-octahedra and nano-cubes towards photo- and electrocatalytic activities

Supporting Information

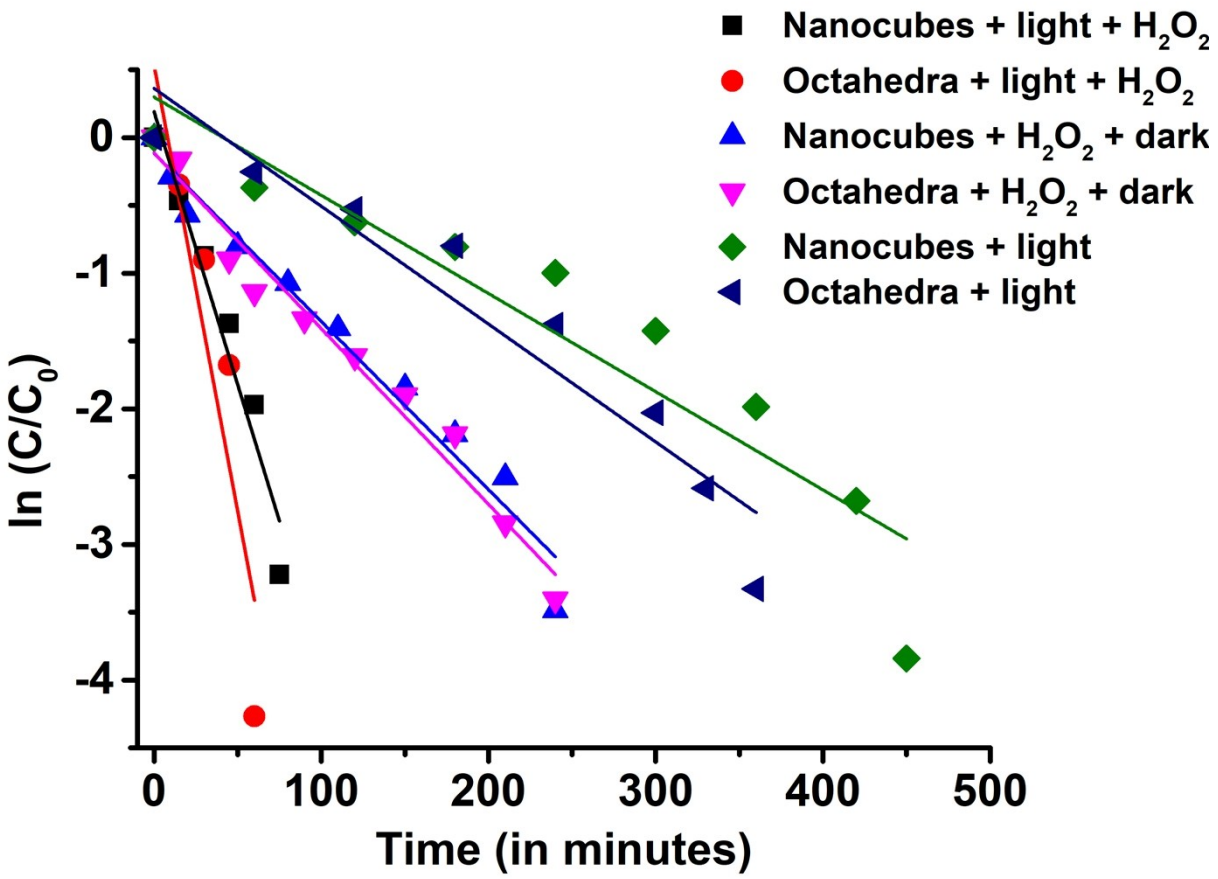

Figure S1: Plot of ln (C/C_0) vs. time for the as- prepared Cu_2O samples, in presence of both H_2O_2 and light, in presence of H_2O_2 in dark and in presence of light but absence of H_2O_2

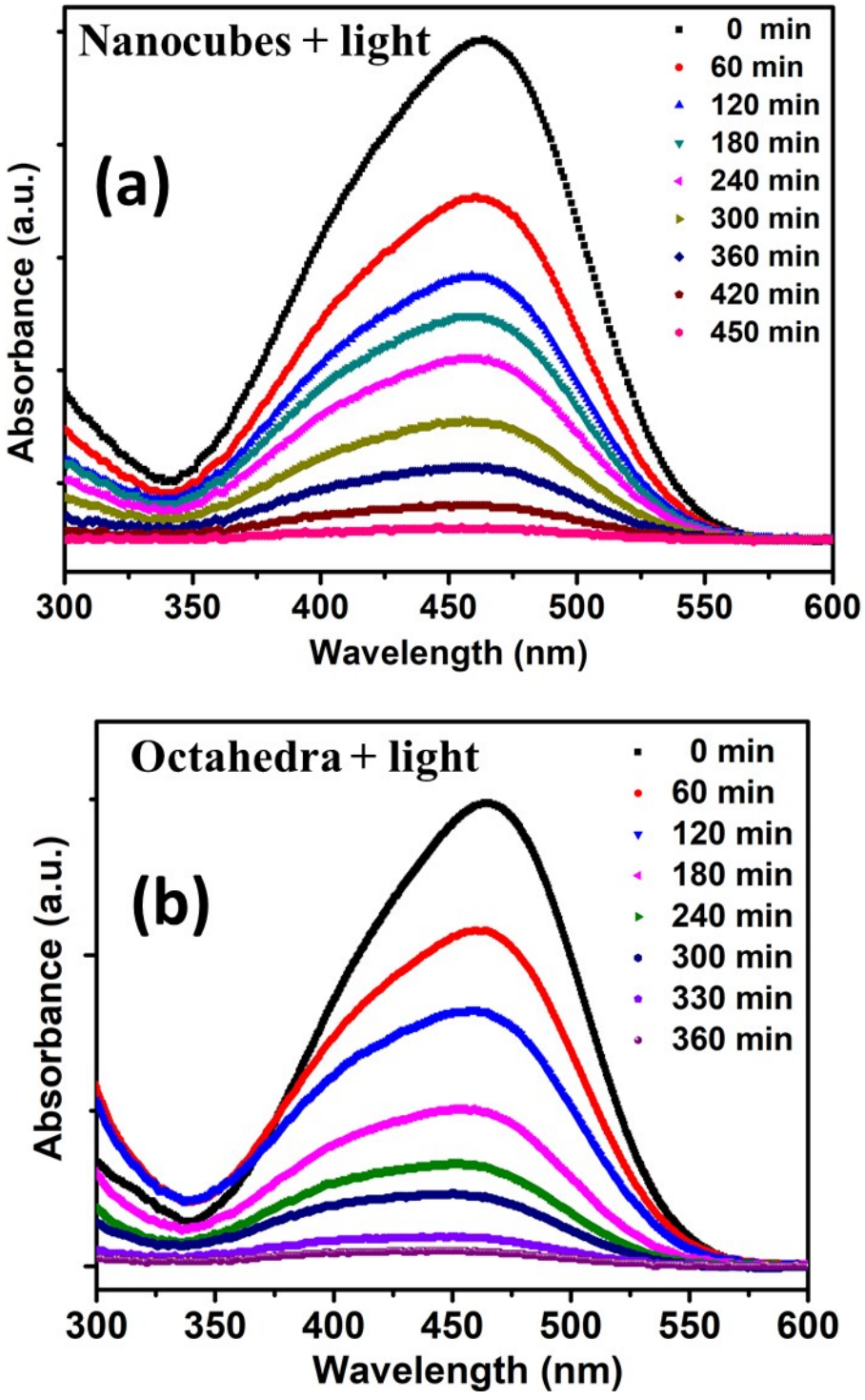

Figure S2: Time dependent UV- Vis spectra of photocatalytic degradation of MO under visible light irradiation by (a) Nanocubes, (b) Octahedra, in presence of light but absence of H_2O_2

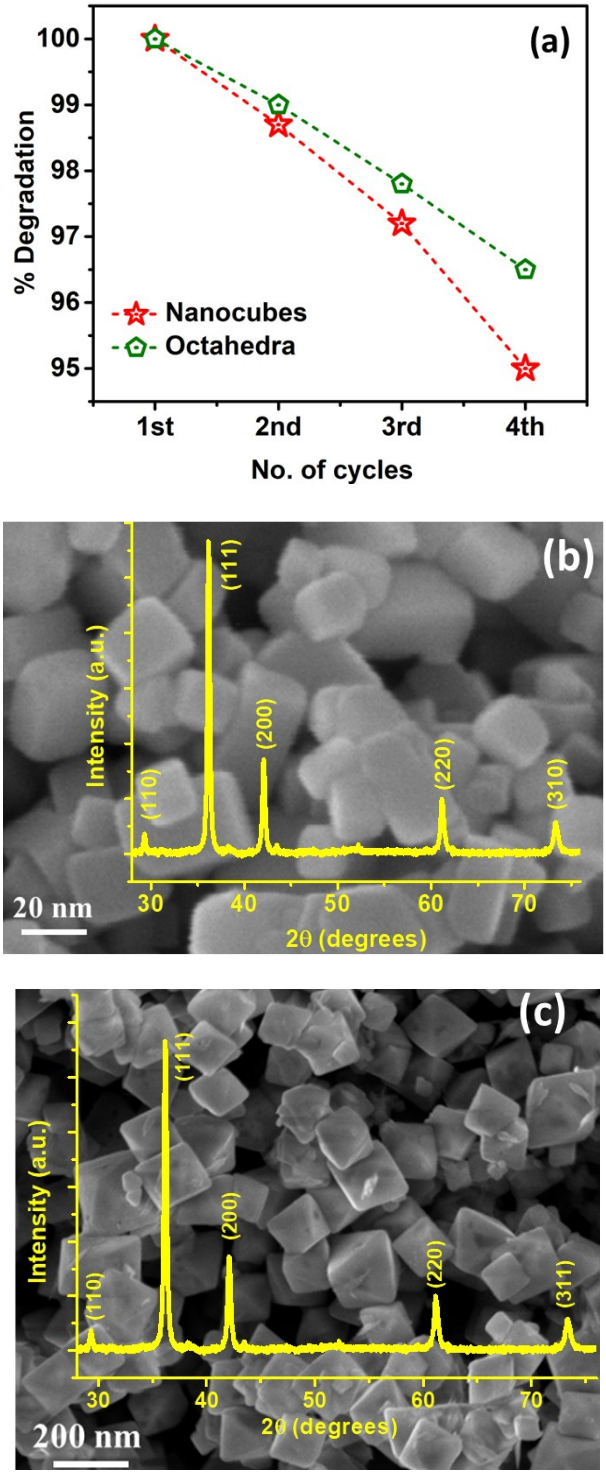

Figure S3: (a) Reusability of Nanocubes and Octahedra samples upto 4 cycles. (b) and (c) shows the morphology of the used Nanocubes and Octahedra photocatalysts, respectively. Inset shows the corresponding structures of the used photocatalysts.

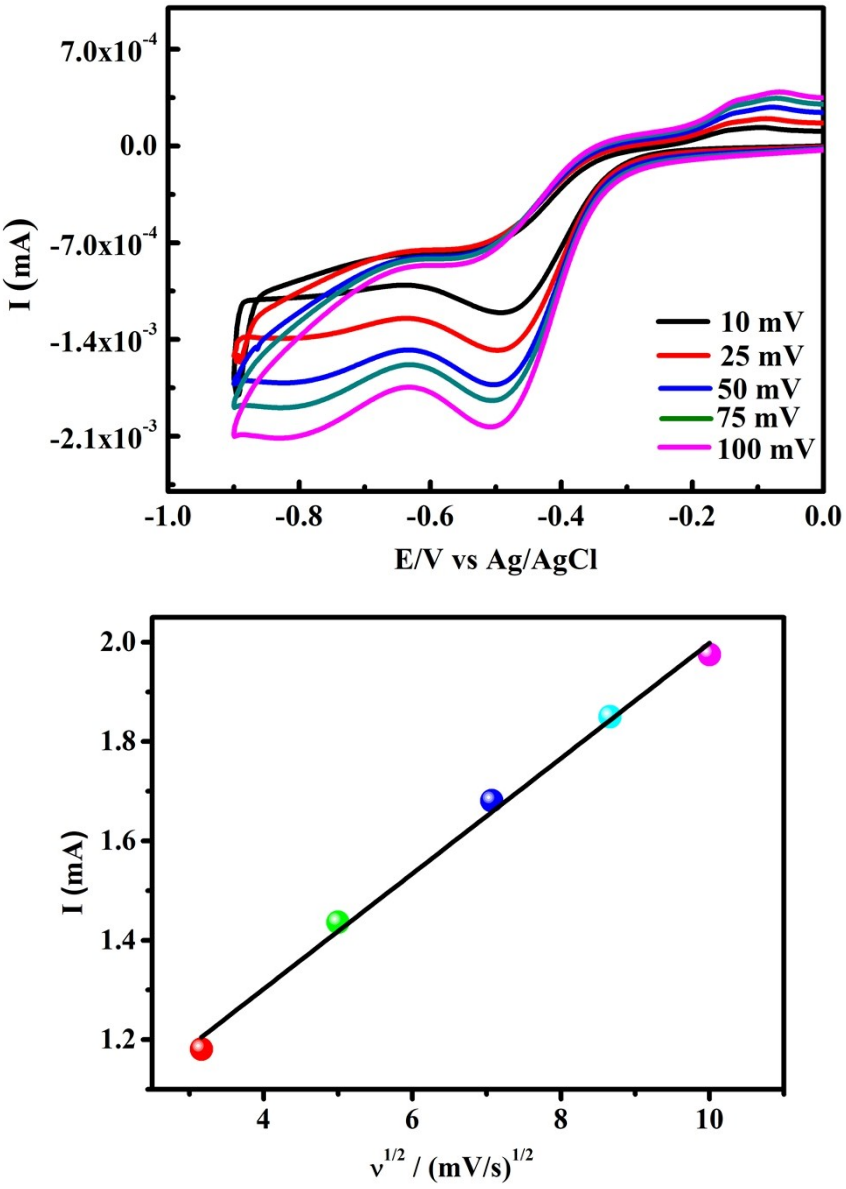

Figure S4: (a) CV of Nanocubes at different scan rate in oxygen saturated 0.1 M KOH solution, (b) The corresponding plot of current vs square root of scan rate.

Sample Name	Photocatalytic activity								Electrocatalytic activity		
	Nanocubes				Octahedra				Sample Name	Nanocubes	Octahedra
Photocata-lysis Condition	% Degrada-tion	Rate constant (min^{-1})	Half life (min)	R^2	% Degrada-tion	Rate constant (min^{-1})	Half life (min)	R^2	**ORR overpotential (vs. Ag/AgCl) (V)**	-0.55	-0.64
Catalyst and H_2O_2 in light	100%	0.041	16.9	0.95	100%	0.065	10.7	0.94	**Current densities (μAmg^{-1})**	275.92	195.41
Catalyst and H_2O_2 in dark	96%	0.012	57.8	0.95	97%	0.013	53.3	0.95			
Catalyst in light	98%	0.007	99	0.95	98%	0.009	77	0.95	**Tafel slope ($mVdec^{-1}$)**	158	228

Table S1: Summary of kinetic data for the photocatalytic degradation of MO as well electrocatalytic activities using prepared Cu_2O nanostructures under visible light irradiation.

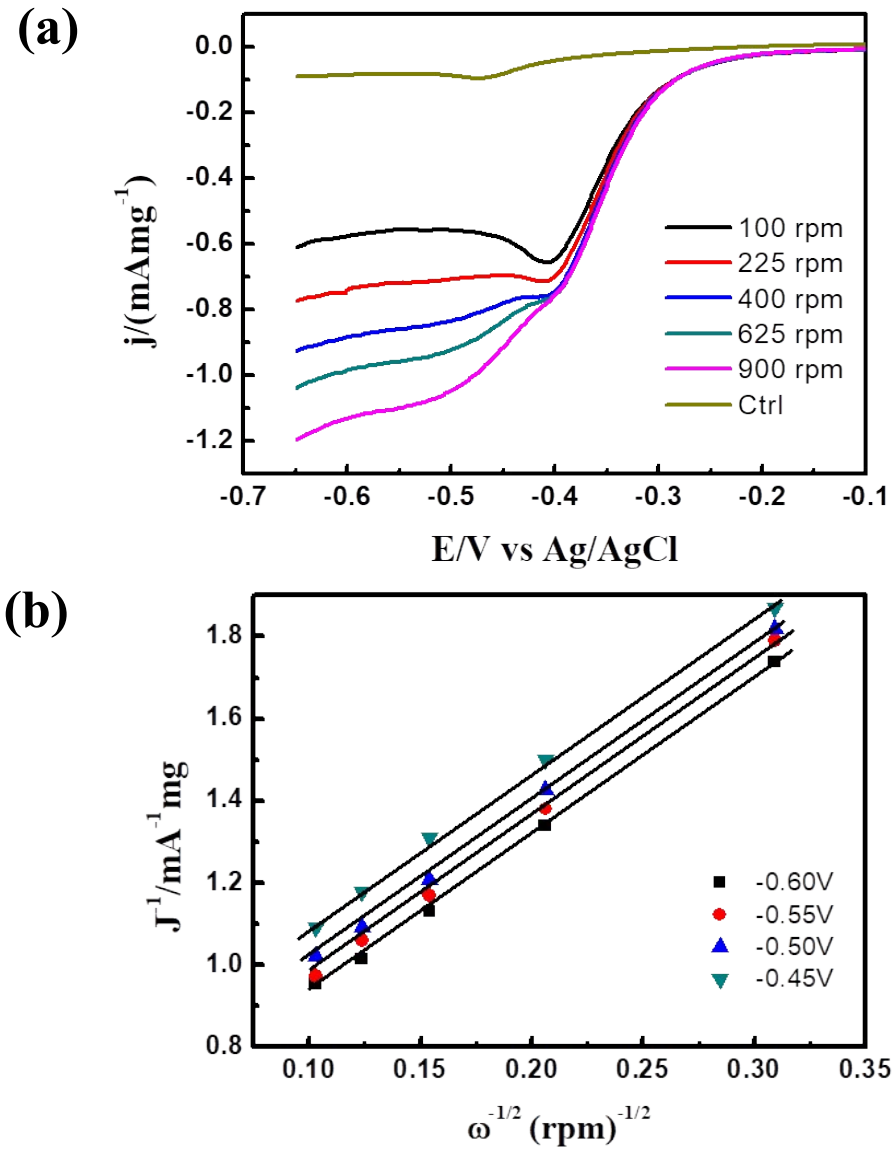

Figure S5: (a) RDE voltammograms of Cu_2O modified electrode at different scan rate in oxygen saturated 0.1 M KOH solution, (b) The corresponding Koutecky-Levich plot for O_2 reduction in 0.1M KOH solution at a scan rate of 10 mv s^{-1}.

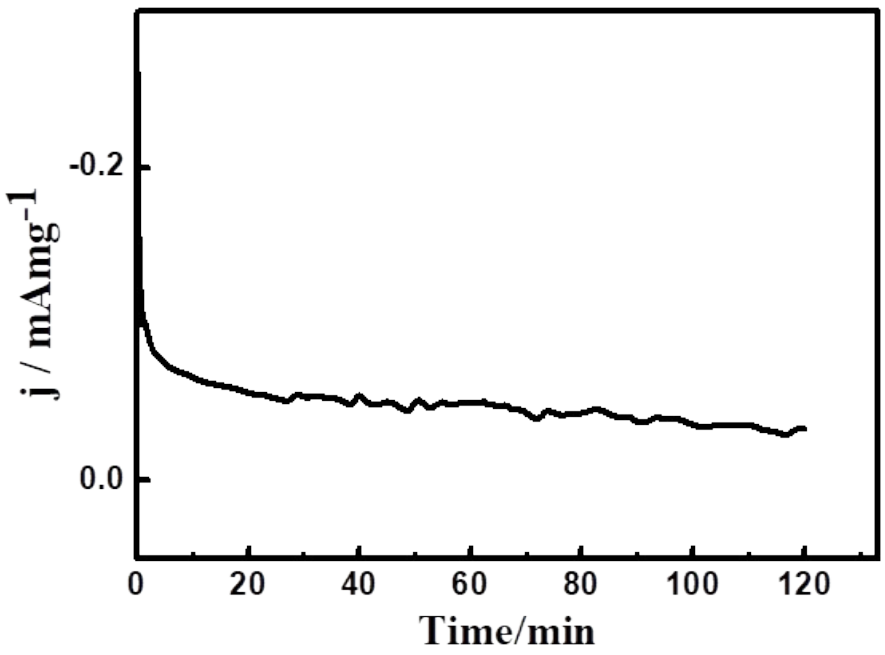

Figure S6: Chronoamperometric data obtained for Cu_2O in O_2 saturated 0.1 M KOHThe potential held at reduction potential.

Sample Name	Morphology	Crystallite size (nm)	Band gap (eV)	Donor density (cm^{-3})	Photocatalytic activity		Electrocatalytic activity		
					Rate constant (min^{-1})	Half life (min)	ORR overpotential (vs. Ag/AgCl) (V)	Current densities (μAmg^{-1})	Tafel slope ($mVdec^{-1}$)
Nanocubes	Uniform nanocubes with (100) exposed facets	20-30	2.4	8.51×10^{10}	0.041	16.9	-0.55	275.92	158
Octahedra	Nano-octahedrons with (111) exposed facets	70-90	2.3	2.4×10^{13}	0.065	10.7	-0.64	195.41	228

Table S2: Table correlating the structural, optical and electrical properties with the photo- and electrocatalytic activities of the Cu_2O nanostuctures.