Supporting Information

Bio-Inspired Branched Au–Cu Nanoalloys as Synergistic Dual-Pathway Peroxidase like activity

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Keywords-Au-Cu Nanoalloy, Coreduction, Green synthesis, Peroxidase mimicking, Multimodal sensing

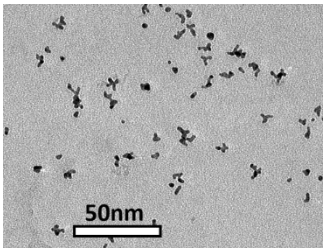


Fig S1a-TEM image after 1 year

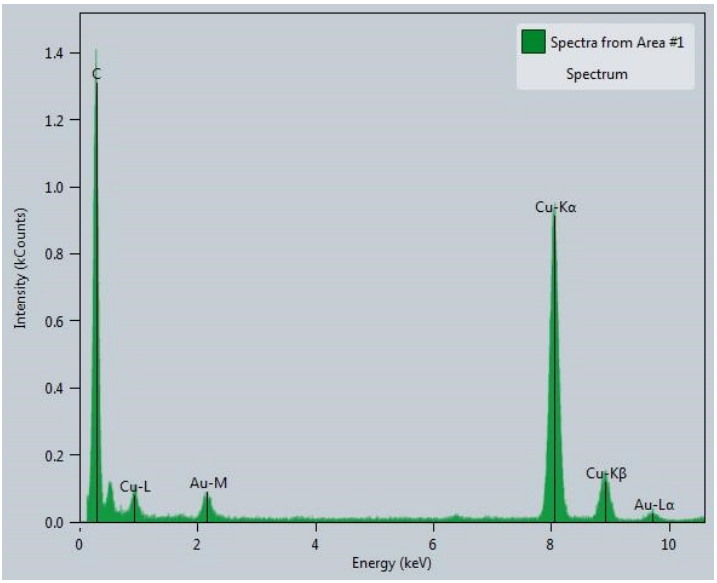


Fig S2 -HAADF EDS spectrum

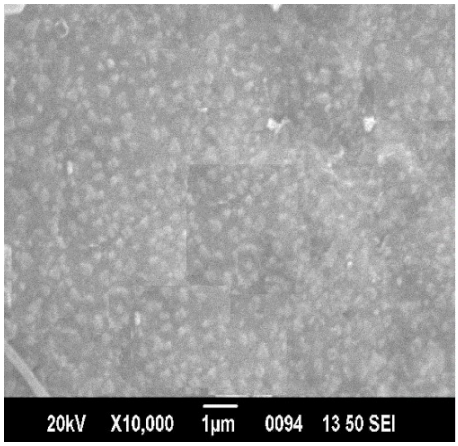
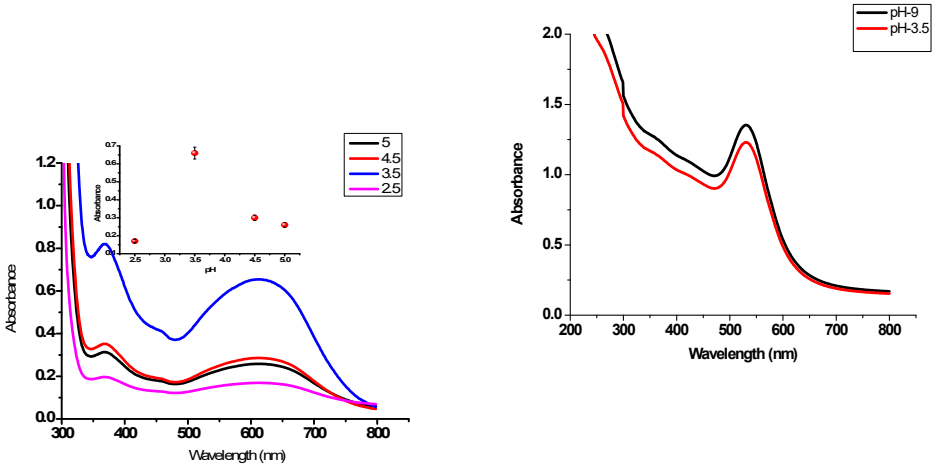


Figure S3-SEM image of Au-Cu NA



a **b**

Fig S4 a- Plot of Absorbance for various pH conditions. Inset show the plot of abs vs pH b- UV-Vis spectrum of Au-Cu NA at pH 9 and 3.

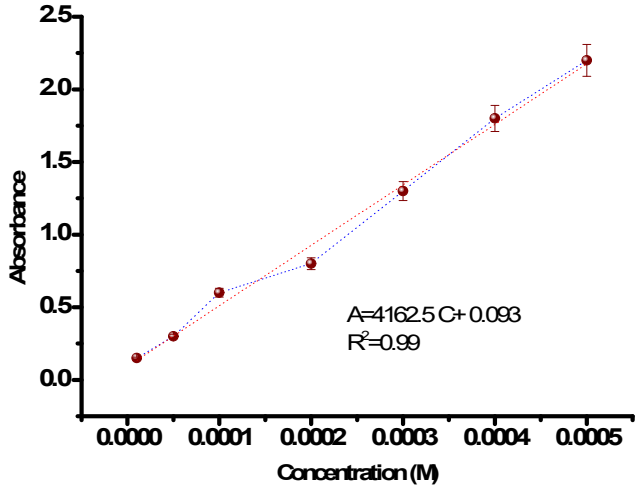


Fig S5- Plot of Abs vs Conc for various concentration of H2O2 from 10μM to 500μM

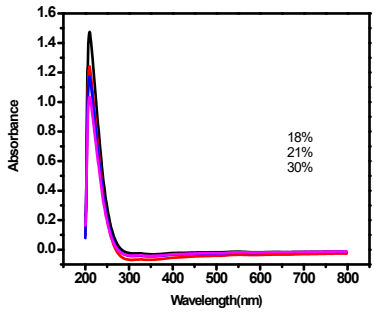
Radical scavenging assay

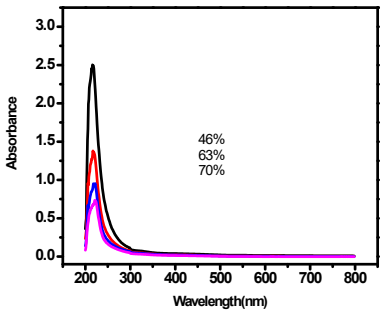
The hydrogen peroxide (H_2O_2) scavenging activity of the samples was evaluated according to the method described by Ruch et al. A 40 mM solution of H_2O_2 was prepared in phosphate buffer and mixed with the test samples. The remaining concentration of H_2O_2 was measured spectrophotometrically by recording the absorbance at 230 nm. The percentage of H_2O_2 scavenging activity was then calculated accordingly. A_0 represents the absorbance of the control sample, while A_1 denotes the absorbance after treatment with ascorbic acid, Cur-GNP and Au-Cu NA.

The figures below illustrate the radical scavenging activity of ascorbic acid,and Au-Cu NA. A progressive decrease in absorbance at 230 nm was observed with increasing concentrations of ascorbic acid and Au-CuNA, indicating enhanced H_2O_2 scavenging activity. Scavenging efficiency is found to be higher for Au-Cu NA. This shows that Au-Cu NA has god catalytic efficiency to rupture O-O bond of H_2O_2.

$$\frac{Ao-A1}{Ao} X100$$

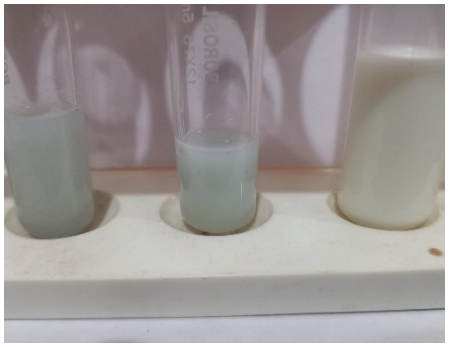
(Reference-Keser, Serhat & Celik, Sait & Türkoğlu, Semra & Yilmaz, Okkes & Turkoglu, Ismail. (2012). Hydrogen Peroxide Radical Scavenging and Total Antioxidant Activity of Hawthorn. Chem J. 2.)

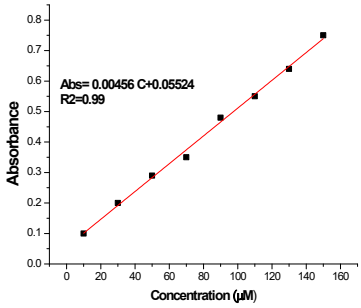




a **b**

Fig S6-Radical scavenging efficiency of a- ascorbic acid b-Au-Cu NA





	Concentration Spiked	Recovered concentration	Recovery %
1	90µM	87 µM	96%
2	130 µM	125 µM	95%

Figure-S7 Real sample analysis and colour change observed for various concentrations of H_2O_2

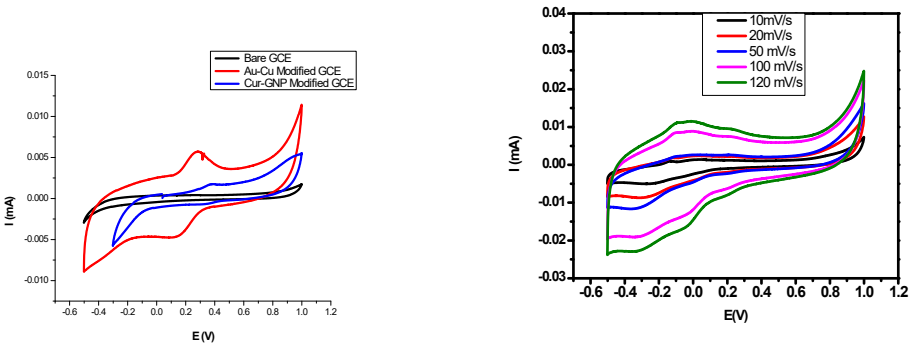


Fig S8 a- Cyclic voltametric response of GCE, Au-Cu nano particle and Gold nanoparticle modified electrode vs SCE. b-Scan rate variation.

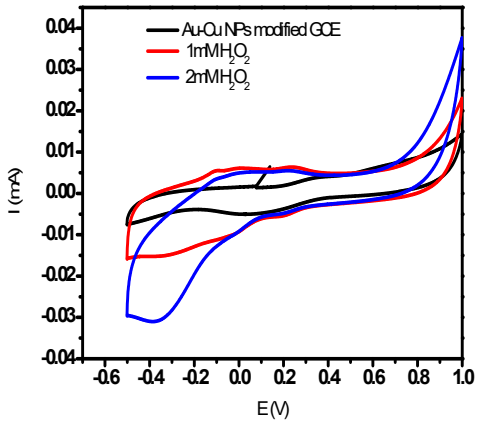
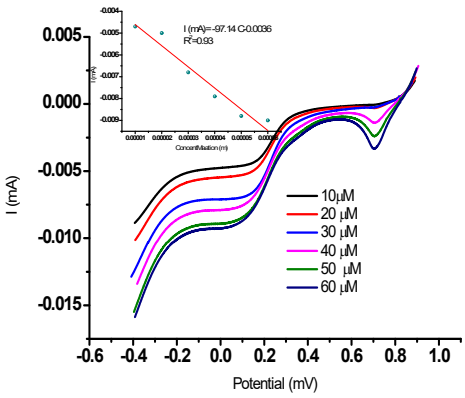


Fig S9- **Cyclic voltametric response of Au-Cu modified electrode in various concentration of H_2O_2.**



FigS10- Calibration plot for the concentration range from 10-60 µM.

Table S1-Showing comparison of detction limits of various gold based nanozymes

SI No.	Type	Detection limit	Reference
1	Gold nano rattles	0.5µM	1
2	Graphene-oxide gold	1.9 nM	2
3	Au@PtNP/GO	1.6 µM	3
4	Fe3O4@PB@Au	13.4 µM	4
5	Au@CMs	7 µM	5
6	Cu doped carbonized bacterial cellulose (BC) nanofibers	2.2 µM	6
7	gold nanoparticles deposited CeO_2	3 µM	7

References

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