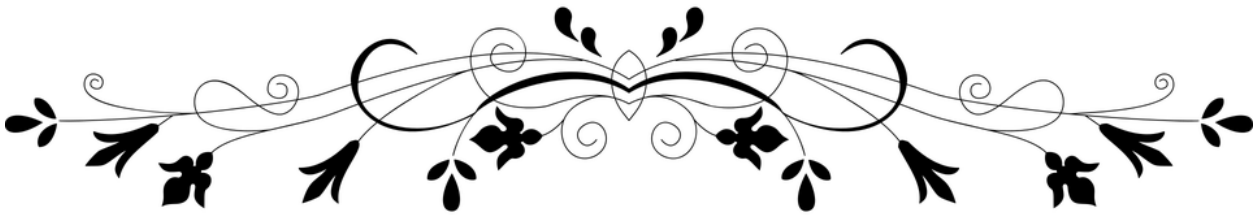

CHAPTER 8

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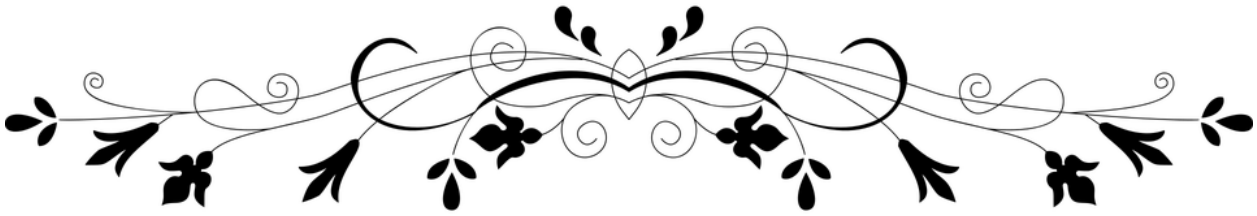
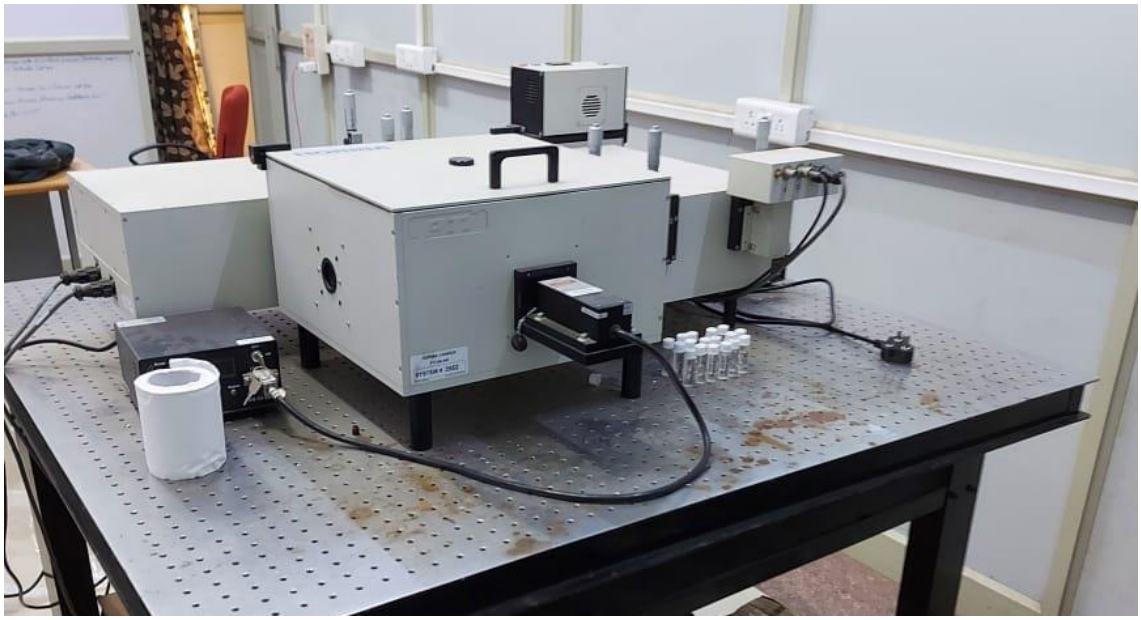


Appendix

Appendix A



Appendix A1: Horiba Spectrofluorometer

Appendix A2: Fluorescent lifetime calculation

Fluorescent lifetime calculated according to the formula given in the equation 1 for triexponential decay function

$$y = \alpha 1 e^{-t/\tau_1} + \alpha 2 e^{-t/\tau_2} + \alpha 3 e^{-t/\tau_3} \quad (1)$$

Where, **y** = fluroscent lifetime

α = fraction of initial intensity decayed

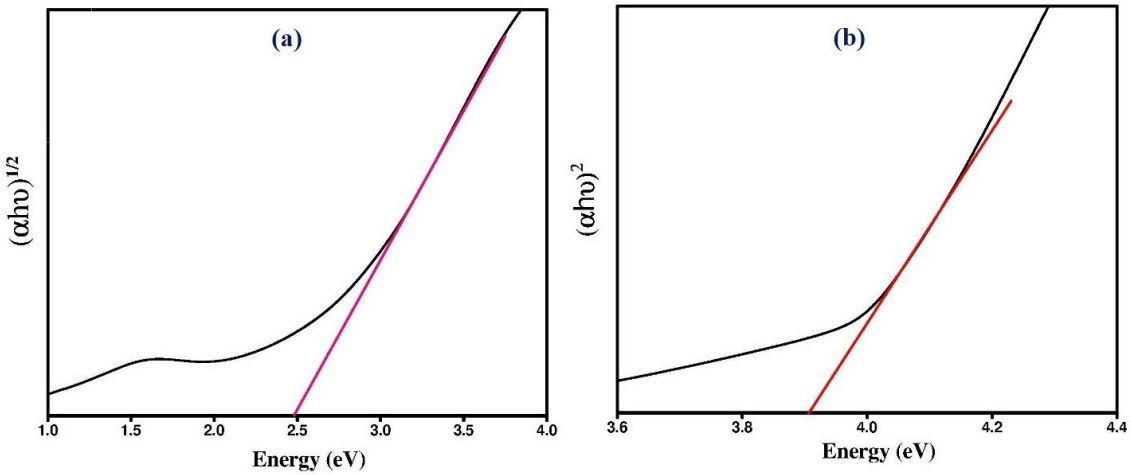
τ = Lifetime

Average lifetime $< \tau >$ calculated according to the equation 2 and represented as

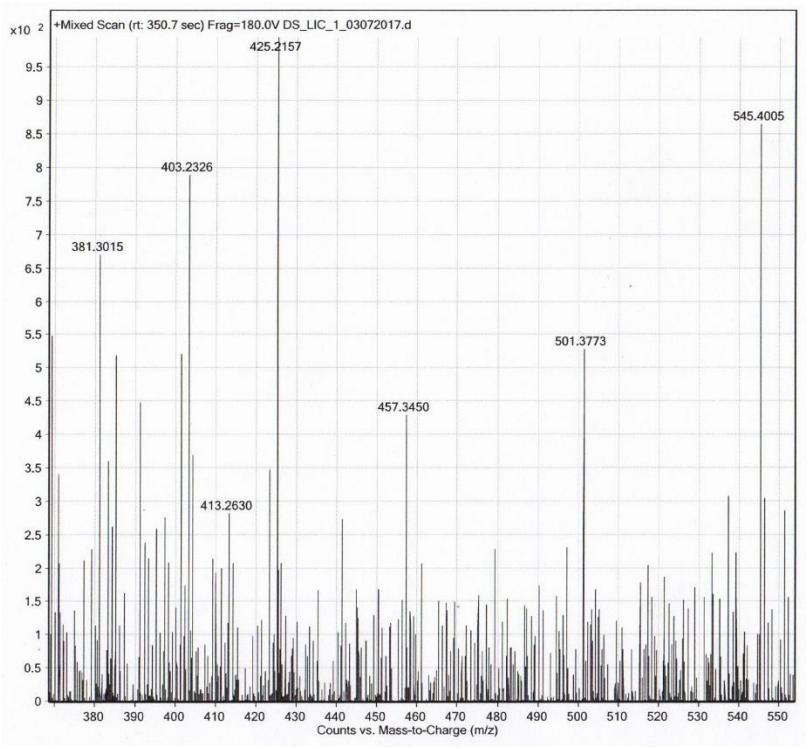
$$< \tau > = \frac{\sum_i^n \alpha i \tau i}{\sum_i^n \alpha i} \quad (2)$$

Table S1. Fitting parameters corresponding to calculation of fluorescent lifetime in control as well as FANC

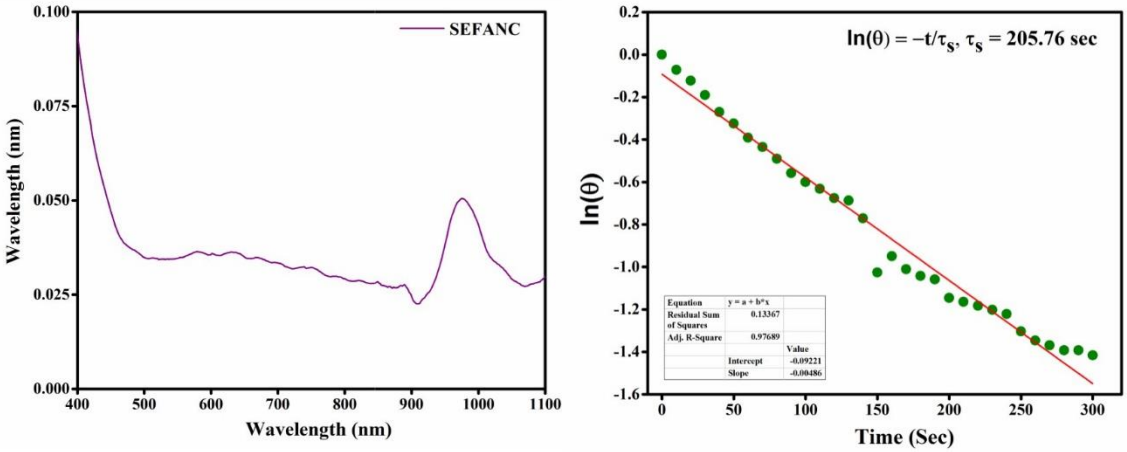
	$\alpha 1$	$\alpha 2$	$\alpha 3$	τ_1	τ_2	τ_3	χ^2
Control	0.12	0.46	0.45	7.92	1.86	0.4	1.19
FANC	0.52	0.09	0.40	2.17	10.4	0.37	0.88



Appendix A3. Tauc plot representing dual band gap Nature of Atacamite Nanoclusters



Appendix A4. ESI-MS analysis of FANC suspension

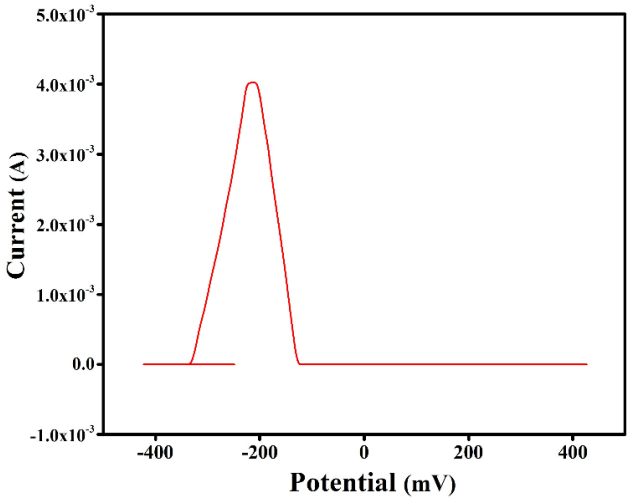


Appendix A6. NIR absorption & photothermal conversion efficiency of SEFANC

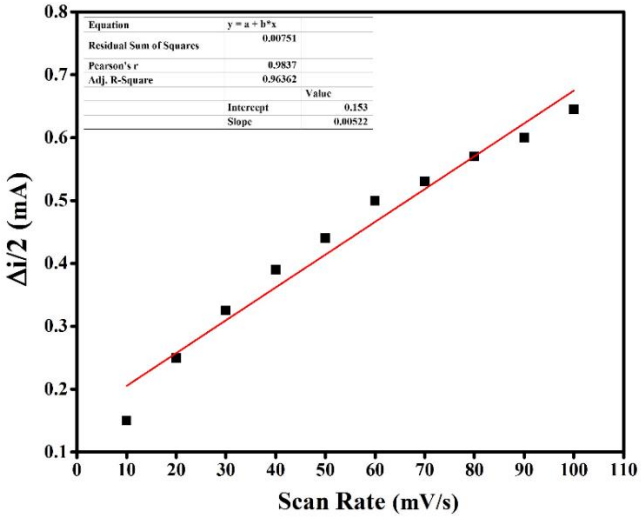
Appendix B

Appendix B1. Quantification of CuO and Cu_2O phases in CONP

Binding energy (eV)	Cation	Assignment	Relative area	Area %
932.68	Cu+	V	36063.56	11.84
933.57	Cu^{2+}	u^o	55645.72	18.27
934.85	Cu^{2+}	u^1	58608.04	19.24
941.37	Cu^{2+}	u^2	35114.97	11.53
943.54	Cu^{2+}	u^3	18915.53	6.21
952.91	Cu^{+}	v^1	27638.02	9.07
954.56	Cu^{2+}	u^4	36502.23	11.98
962.13	Cu^{2+}	u^5	36064.75	11.84

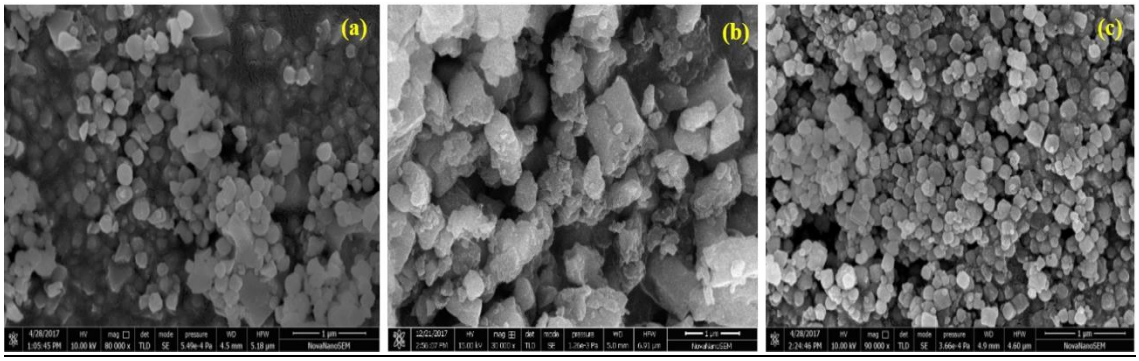


Appendix B2. Square wave voltammetry plot of CONP

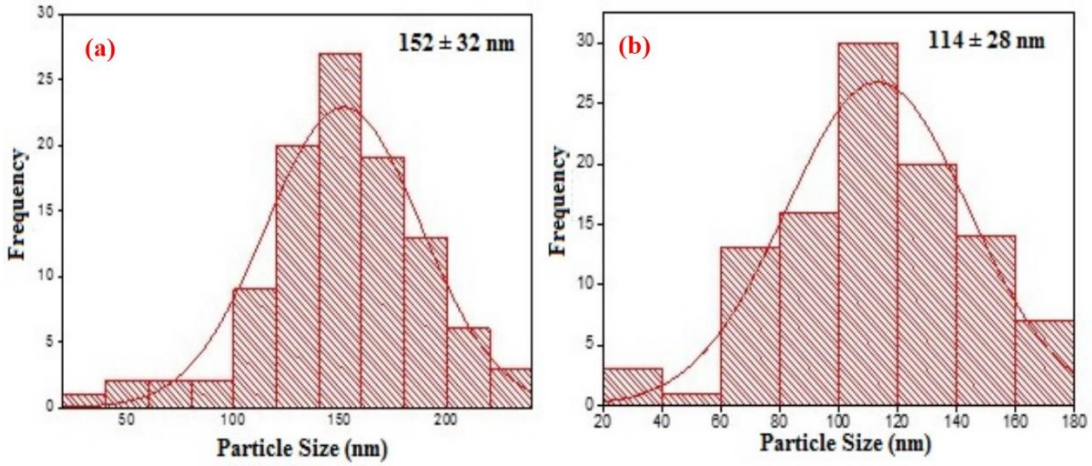


Appendix B3. Linear regression between current density differene in the middle of open circuit open circuit potential window Vs. scan rate

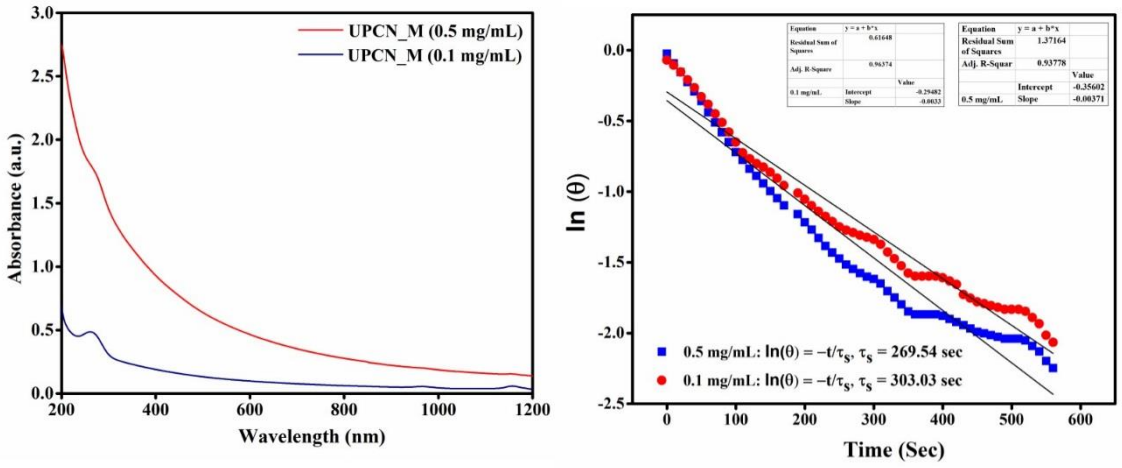
Appendix C



Appendix C1. Scanning Electron Micrograph of UPCN_M synthesized at 2h, 5h and 15h

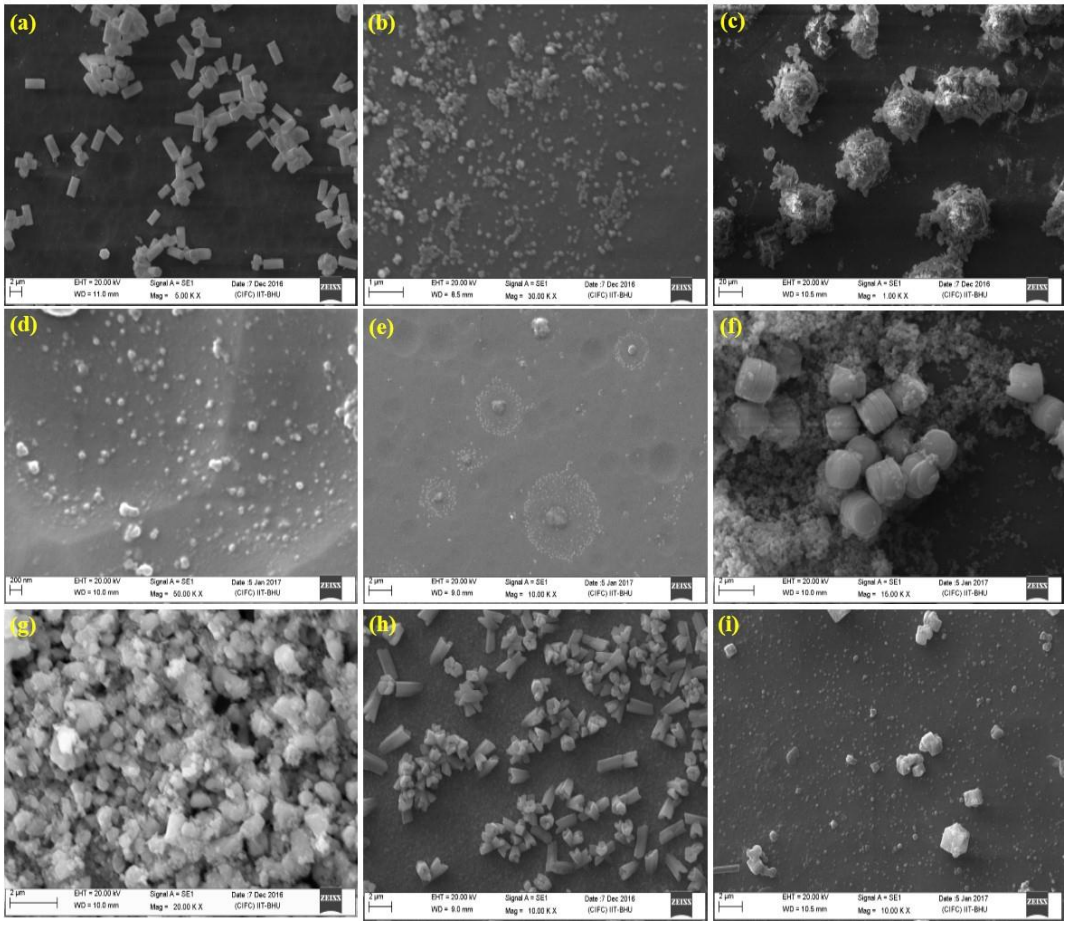


Appendix C2. Size distribution analysis of UPCN _M synthesized at 2h and 15h

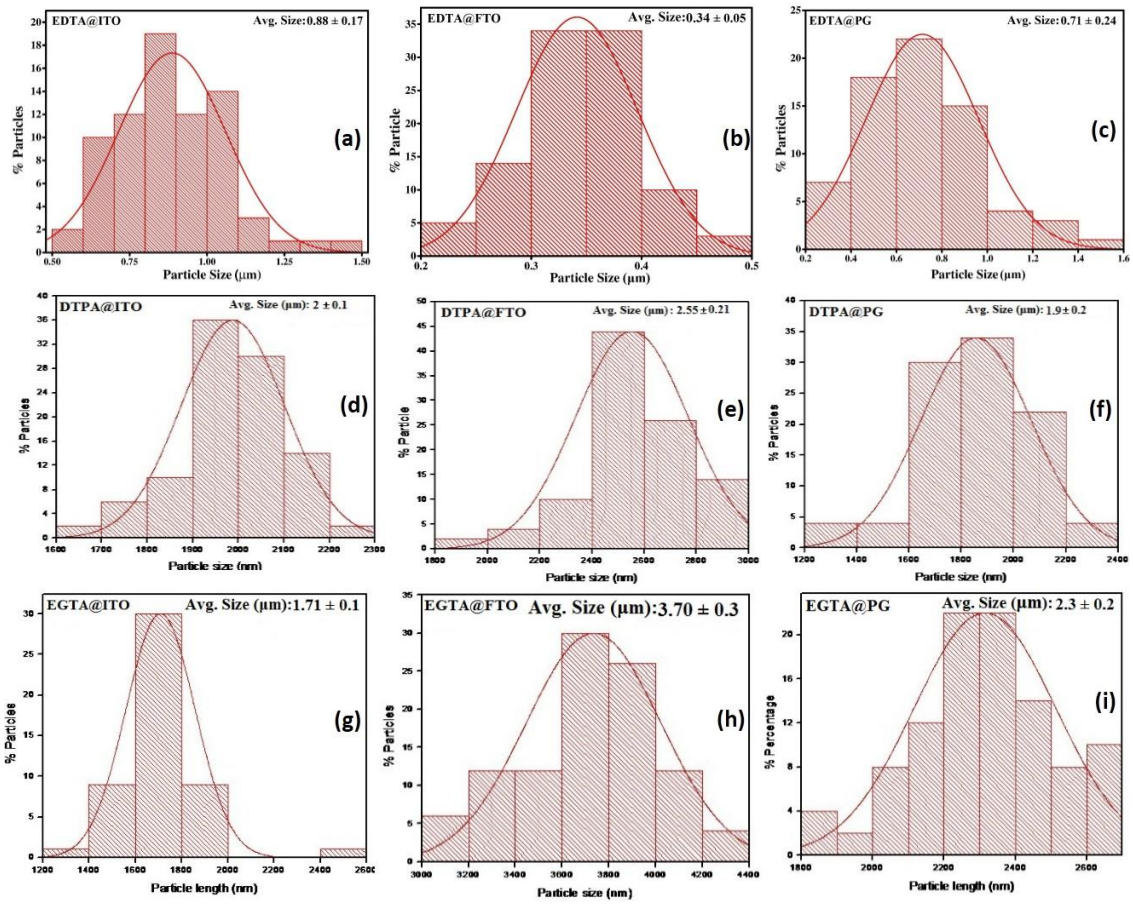


Appendix C3. The photothermal conversion efficiency in case of UPCN_M by using 975 nm NIR

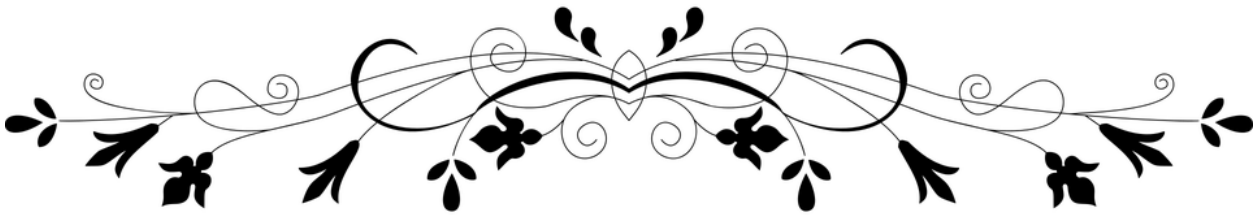
Appendix D



Appendix D1. Scanning electron micrographs of UCP deposited on substrate. (a)UCP_EDTA@ITO, (b) UCP_EDTA@FTO, (c) UCP_EDTA@PG, (d) UCP_DTPA@ITO, (e) UCP_DTPA@FTO, (f) UCP_DTPA@PG, (g) UCP_EGTA@ITO, (h) UCP_EGTA@FTO, (i) UCP_EGTA@PG



Appendix D2. Size distribution of UCP synthesized (a)UCP_EDTA@ITO, (b) UCP_EDTA@FTO, (c) UCP_EDTA@PG, (d) UCP_DTPA@ITO, (e) UCP_DTPA@FTO, (f) UCP_DTPA@PG, (g) UCP_EGTA@ITO, (h) UCP_EGTA@FTO, (i) UCP_EGTA@PG



List of Research publications

- Development of Biocompatible Atacamite Nano-clusters for Bioimaging and Photothermal Applications, **Kedar Sahoo**, Deepak Khare, Ashutosh Dubey, Saripella Srikrishna, Manoj Kumar, *Nanotechnology*, 2020,31, 265102.
- Green Route synthesized $NaYF_4$: Yb^{3+}, Tm^{3+} Nanophosphors and its Photophysical and Magnetic Characterization, **Kedar Sahoo**, Sudhir Ranjan, Md. Imteyaz Ahmad, Manoj Kumar, *Journal of Luminescence*, 2020, 228, 117654.
- Lattice-Strain induced photophysical properties of $NaYF_4$: Yb^{3+}, Tm^{3+} upconverting phosphors, **Kedar Sahoo**, Sudhir Ranjan, Manoj Kumar (Under Review).
- Copper oxide nanoparticle: Multiple functionalities in photothermal therapy and electrochemical energy storage, **Kedar Sahoo**, Neelima Varshney, Tapas Das, Dr. Sanjeev Kumar Mahto, Manoj Kumar (Under Review).
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- Development of Ultrasensitive and As(III)-Selective Upconverting ($NaYF_4$:Yb^{3+}, Er^{3+}) platform, Suman Duhan, **Kedar Sahoo**, Sudhir Kumar Singh, Manoj Kumar*, *Analyst*, 2020, 145, 6378-6387.
- Chelating agent and substrate effect on the hydrothermal growth of Yb^{3+}/Er^{3+} doped $NaYF_4$ film, Suman Duhan, **Kedar Sahoo**, Md. Imteyaz Ahmad, Sudhir Kumar Singh, Manoj Kumar, *Processing and Applications in Ceramics*, 2021, 15, 69-78.
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- Studies of microstructural, Dielectric, and Impedance spectroscopic properties of Bi0.617Y0.05Cu3Ti4O12 ceramic Synthesized through semi-wet route, Journal of Materials Science: Materials in Electronics (JMSE), 2021 (Just accepted).
- Forecast of Phase Diagram for synthesis of complex worth for the detection of Cr^{6+} ions, Chaudhary Sumit; Rai RamaNand; **Sahoo Kedar**; Kumar Manoj (2021), *ACS* Omega (Just Accepted).