Electronic supplementary information (ESI) for Nanoscale
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Luminescent Quantum Clusters of Gold in Transferrin Family Protein, Lactoferrin Exhibiting FRET

Paulrajpillai Lourdu Xavier[1], Kamalesh Chaudhari[2], Pramod Kumar Verma[3], Samir Kumar Pal[3], Thalappil Pradeep[1*]

[1]DST Unit on Nanoscience (DST UNS), Department of Chemistry and Sophisticated Analytical Instrument Facility, Indian Institute of Technology Madras, Chennai 600 036, India
[2]Department of Biotechnology, Indian Institute of Technology Madras, Chennai 600 036, India
[3]Unit for Nanoscience and Technology, Department of Chemical, Biological and Macromolecular Sciences, Satyendra Nath Bose National Centre for Basic Sciences, Block JD, Sector III, Salt Lake, Kolkata 700 098, India

SDS-PAGE analysis of NLf, photograph of solid state luminescence, photoluminescence spectra of Au_{QC}@ALf, Au_{QC}@NLf and Au_{QC}@HLf and comparison between luminescence intensity of clusters synthesized with different forms of Lf at different temperatures, TEM images of Au_{QC}@NLf nanoparticles and clusters, effect of electron beam irradiation on clusters, EDAX spectrum of the sample taken in HRTEM, method of sample preparation for MALDI MS, observed red shift in emission spectrum at alkaline pH, UV-Visible spectra of cluster after adding different concentrations Cu^{2+}.

Electronic supplementary information 1

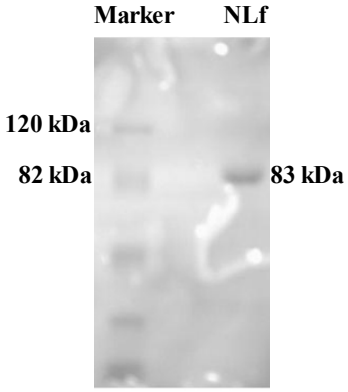

Fig. S1: Purity of NLf was tested by SDS-PAGE analysis. Also see MALDI –TOF-MS data (Fig. 3).

Electronic supplementary information 2

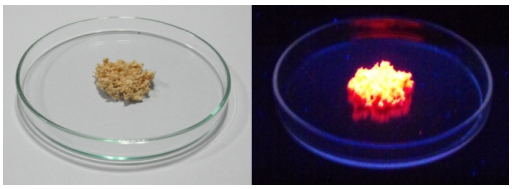

Fig. S2: Solid state luminescence of Au_{QC}@NLf, photograph taken in visible light (left) and UV light (right).

Electronic supplementary information 3

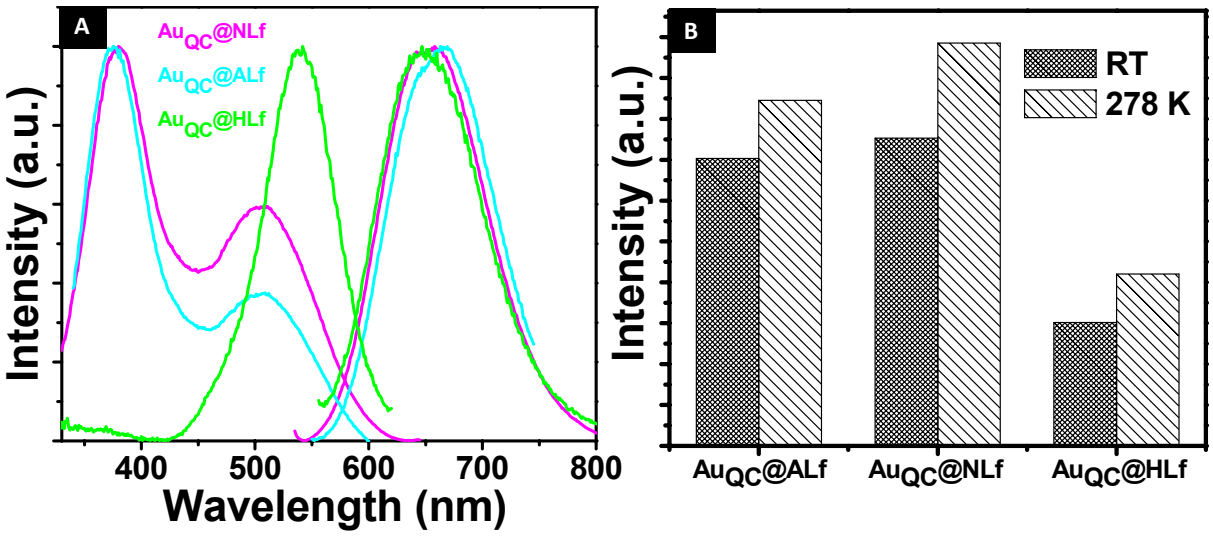

Fig. S3: (A) Normalized photoluminescence spectra of Au_{QC}@ALf, Au_{QC}@NLf and Au_{QC}@HLf (excitation spectra were collected by keeping emission at 650 nm and emission spectra were collected by keeping excitation at 510 nm) (B) Comparison of emission intensities of Au_{QC}@ALf, Au_{QC}@NLf and Au_{QC}@HLf at RT and 278 K.

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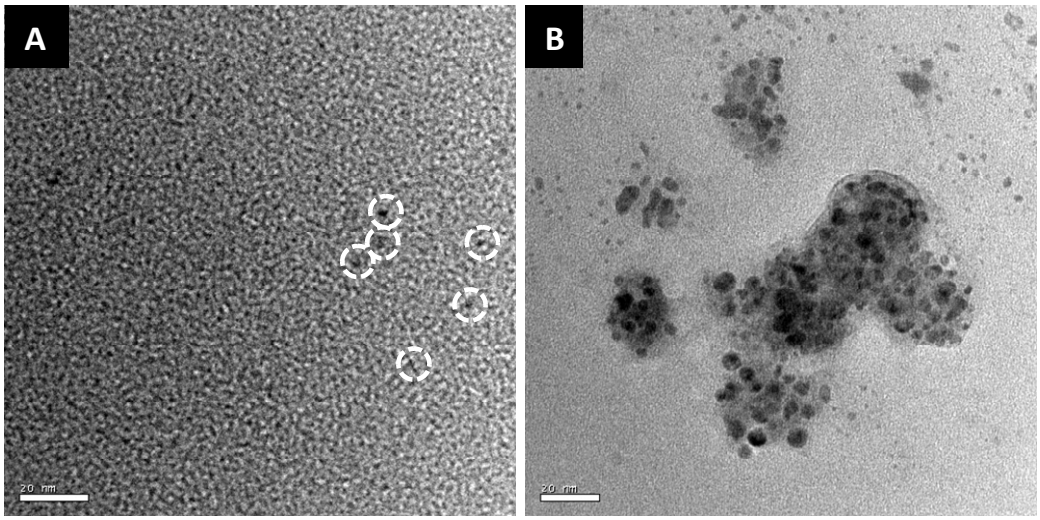

Fig. S4: TEM images of Au_{QC}@NLf with gold:NLf ratio (A) 17:1 and (B) 67:1 (scale bar is 20 nm).

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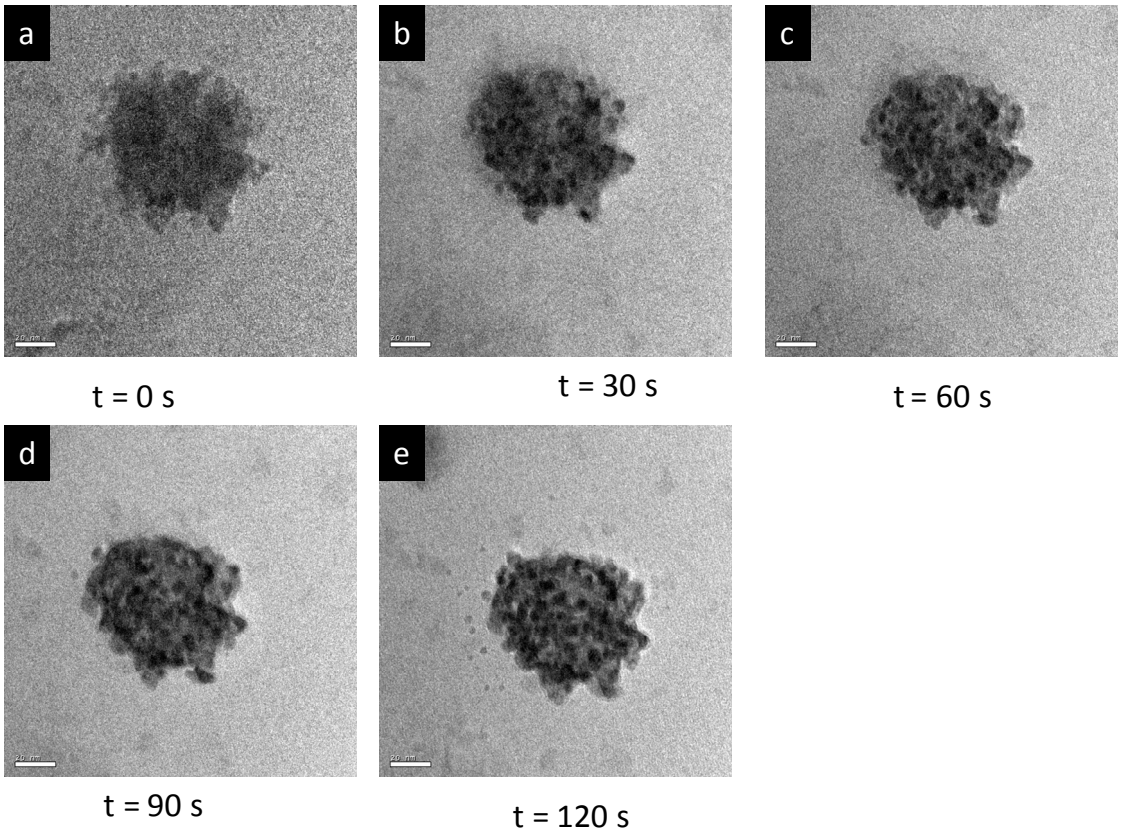

Fig. S5: Effect of electron beam irradiation on clusters (scale bar is 20 nm). A cluster aggregate was chosen to show this effect.

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EDAX spectrum of the sample taken in HRTEM

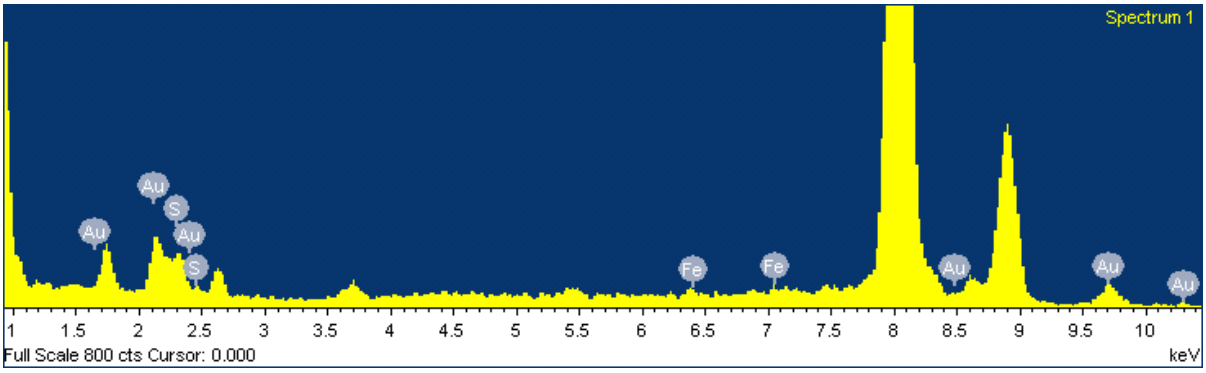

Fig. S6: EDAX spectrum of the sample showing the presence of Au, S and Fe in Au_{QC}@NLf.

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Method of sample preparation for MALDI MS

Cluster solution was prepared as follows,

A = 100 µL Au_{QC}@NLf (dialysed against deionized water)

Matrix solution was prepared as follows,

B = 10 mg Sinapinic acid + 250 µL Acetonitrile + 750 µL TFA (0.1% in deionized water)

Final solution for spotting was,

C = 5 µL of (A) + 100 µL of (B)

C was spotted and dried in ambient air.

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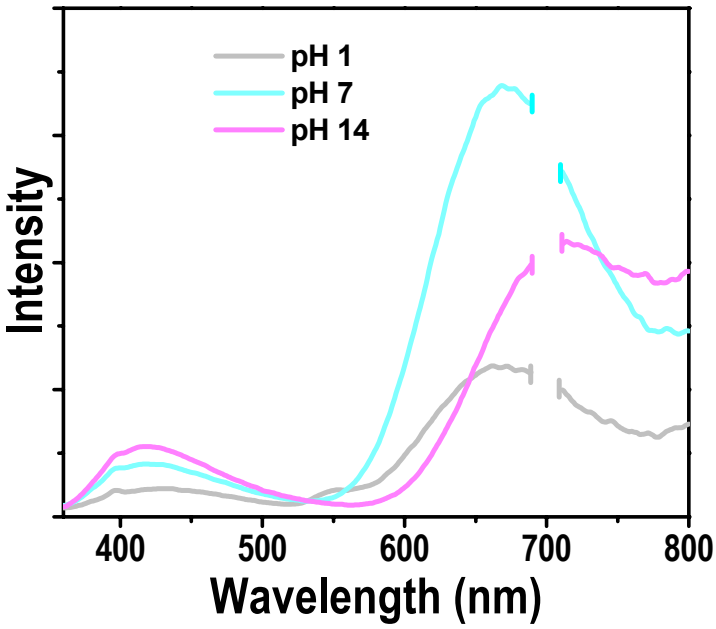

Fig. S8: Red shift observed in emission spectrum of Au_{QC}@NLf at highly alkaline pH. The region where second order line interferes has been removed.

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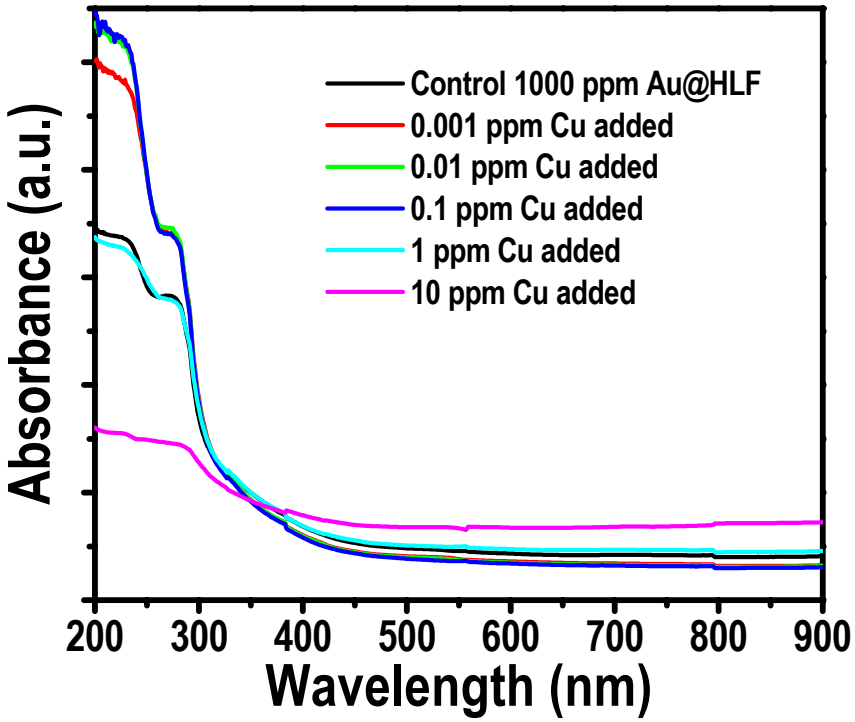

Fig. S9: Change in absorption spectrum upon increasing Cu^{2+} concentration. Note the increase in background at 900 nm. From this we conclude that the reason for Au_{QC}@NLf quenching by Cu^{2+} at 10 ppm is aggregation which leads to reduction of UV-Vis absorbance at lower wavelength, but an increase in background due to scattering.