

Electronic Supplementary Information

Green Synthesis of Plant-Derived Protein Protected Copper Quantum Cluster for Intrauterine Device Application

Meeple S. Mathew¹, Joyal Davis² & Kuruvilla Joseph^{1*}

¹Department of Chemistry, Indian Institute of Space Science and Technology, Valiamala, Thiruvananthapuram,
Kerala, 695547, India. E-mail: kjoseph.iist@gmail.com.

²Department of Chemistry, Indian Institute of Science Education and Research, Mohali, Punjab. India

Table S1. Quantum Yield Calculation

Sample	Exc. λ (nm)	Φ_0	A_0	I_0	n_0	A_s	I_s	n_s	Φ_s (%)
CuQC	325	0.54	0.063	2.3×10^8	1.33	0.07	1.2×10^7	1.33	2.57

Where, Φ_0 : Reference QY, Φ_s : Sample QY, I_0 and A_0 are the absorbance and intensity of reference respectively, I_s and A_s are intensity and absorbance of the sample respectively, n_0 and n_s are the refractive index of the solvent used reference and sample respectively.

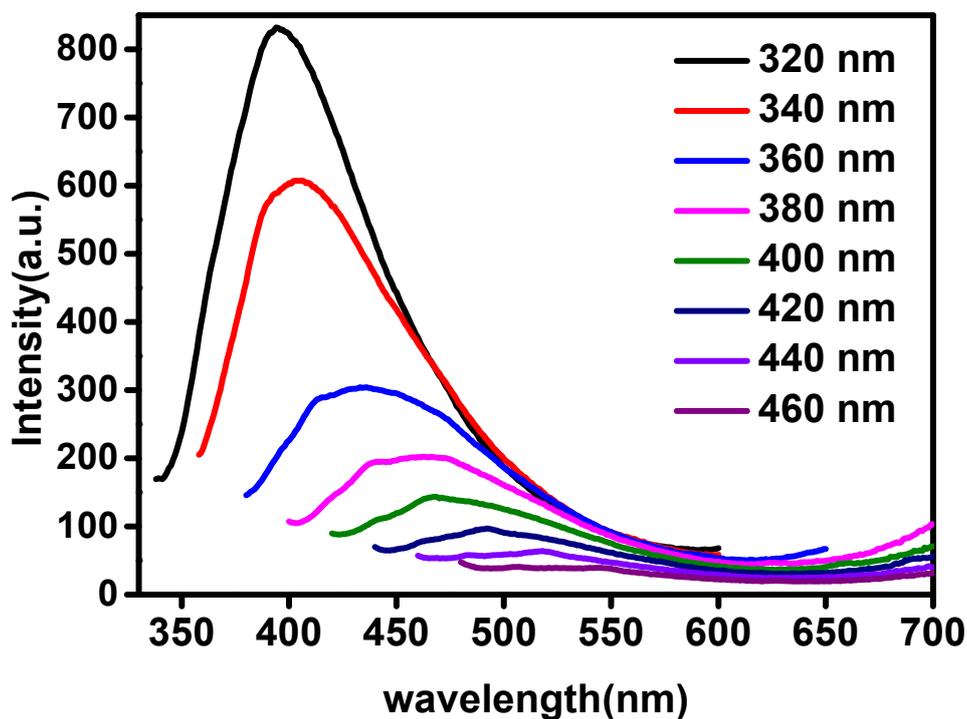


Figure S1. Excitation dependent emission spectra of CuQC

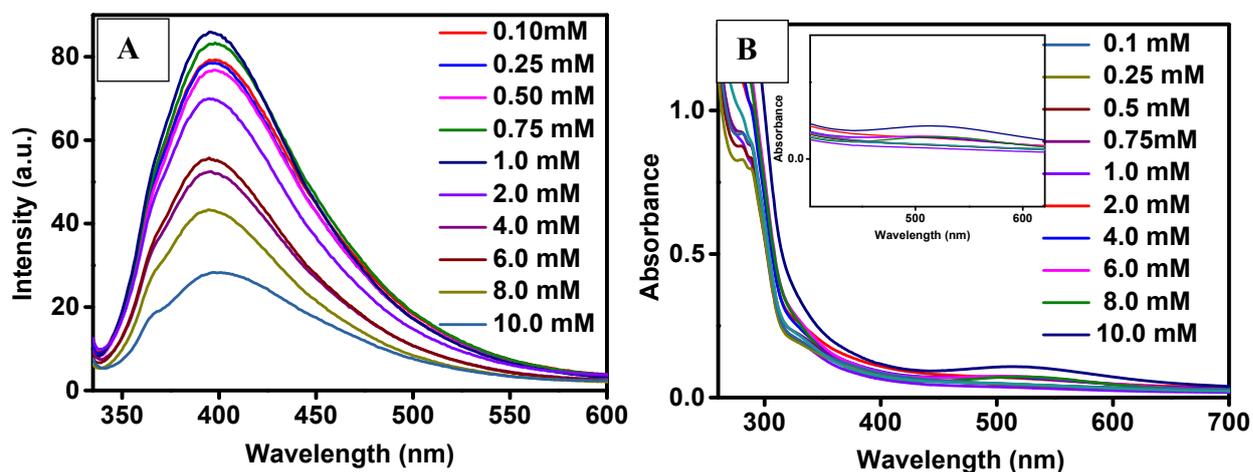


Figure S2. Fluorescence emission spectra ($\lambda_{ex} = 320 \text{ nm}$) and absorption spectra of evaluation of clusters with various concentration of CuSO_4 . Concentration of gluten (25 mg/mL) was maintained as constant. The spectra were collected after 7 hour reaction at 55 °C.

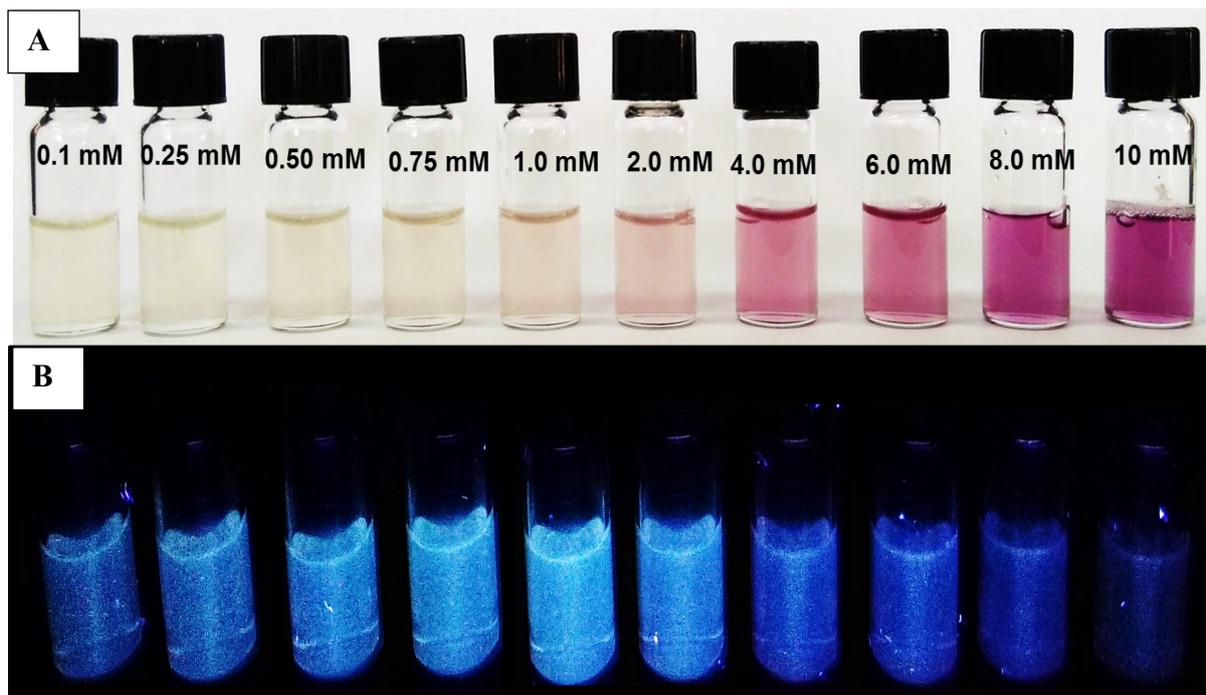


Figure S3: Photograph of CuQC formation at various concentration of CuSO₄ under visible light and UV light ($\lambda_{ex} = 365 \text{ nm}$)

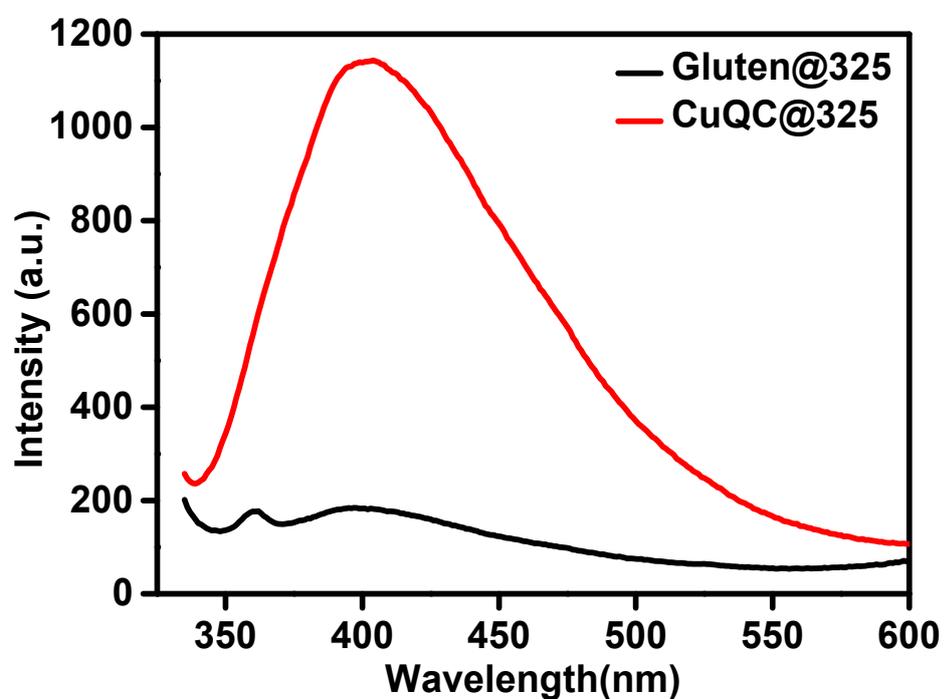


Figure S4. Fluorescence spectra of gluten (black trace) and CuQC (red trace) ($\lambda_{ex} = 325 \text{ nm}$).

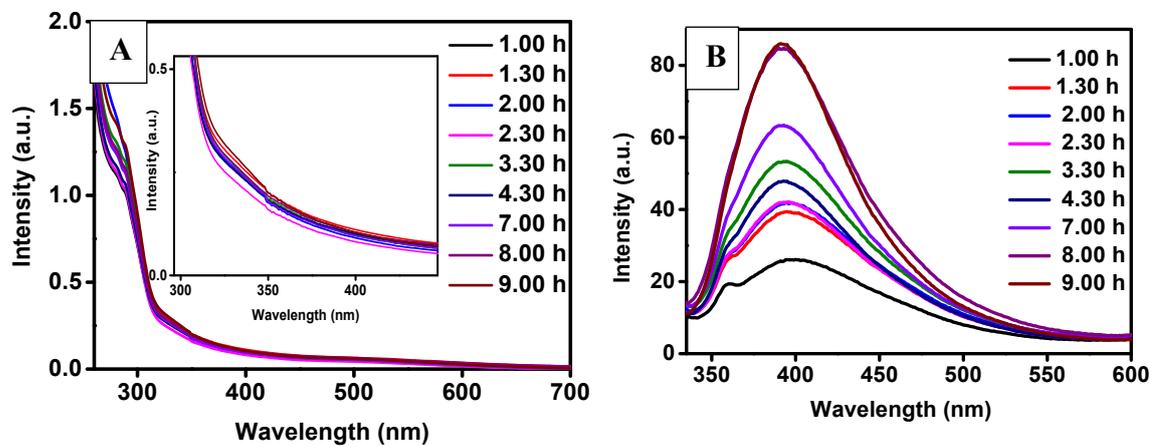


Figure S5. (A) Absorption spectra and (B) emission spectra ($\lambda_{\text{ex}} = 320 \text{ nm}$) at different time points during their synthesis. Concentration of CuSO_4 (1 mM) and gluten (25 mg/mL) maintained as constant. The spectra were collected with different time interval stars from 1h to 9 h.

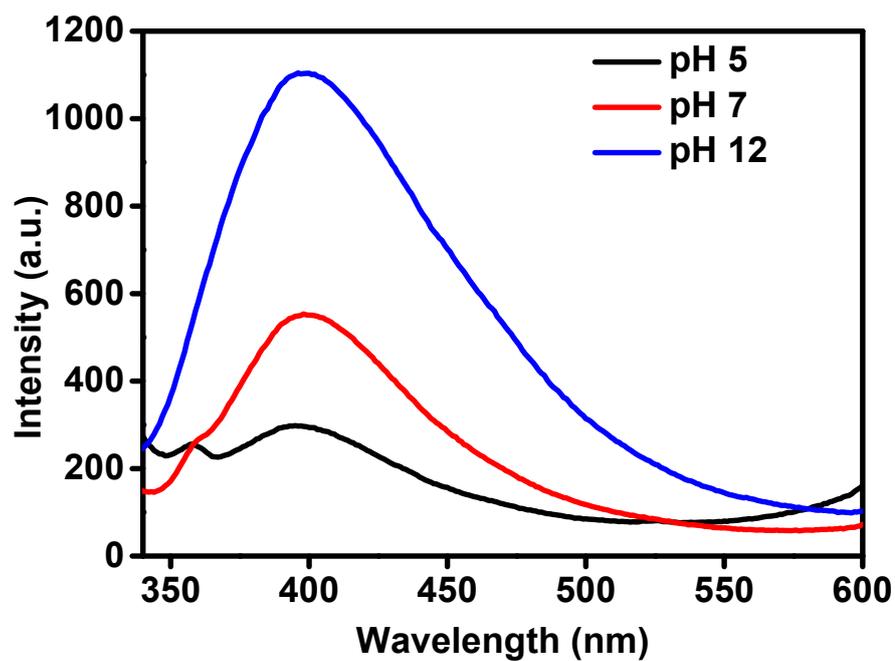


Figure S6: Fluorescent emission spectra ($\lambda_{\text{exc}} = 325 \text{ nm}$) for CuQC synthesized at different pHs.

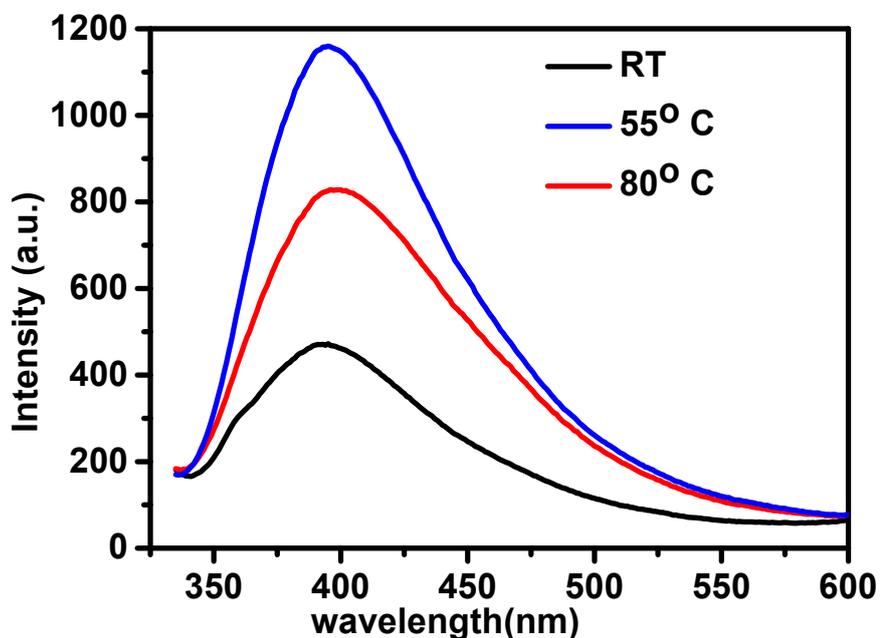


Figure S7. Fluorescence emission spectra ($\lambda_{\text{exc}} = 325 \text{ nm}$) of evaluation of clusters with various temperature. Concentration of gluten (25 mg/ml) and gold (5 mM) were maintained as constant. The spectra were collected after 8 hour reaction.

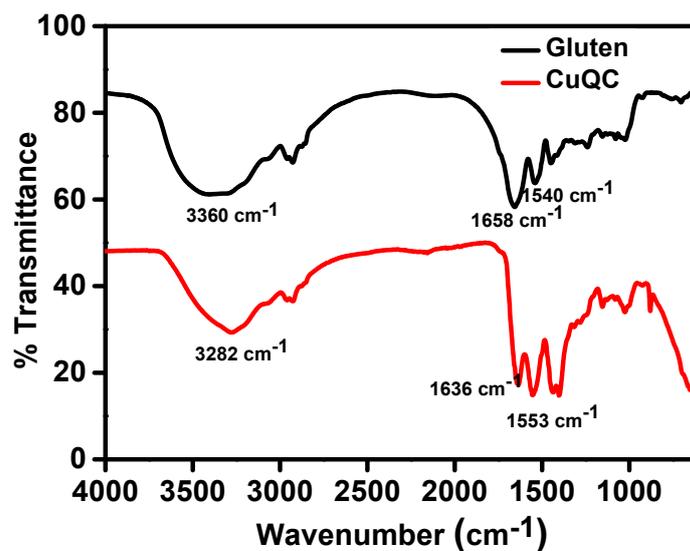


Figure S8: FTIR spectra of gluten and CuQC

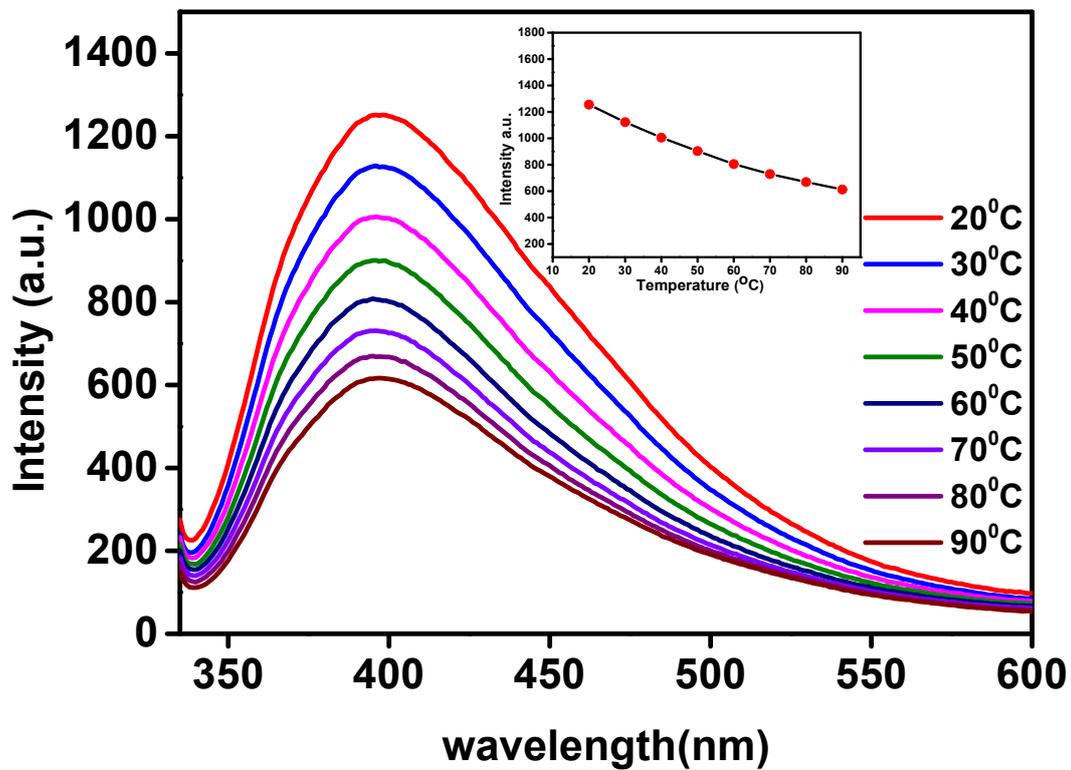


Figure S9. Fluorescent Emission spectra of CuQC subjected to various temperatures