

Supporting Information of
Piperidine carboxylic acid dithiocarbamate molecular assembly on gold nanoparticles for selective and sensitive detection of Al^{3+} ion in water samples

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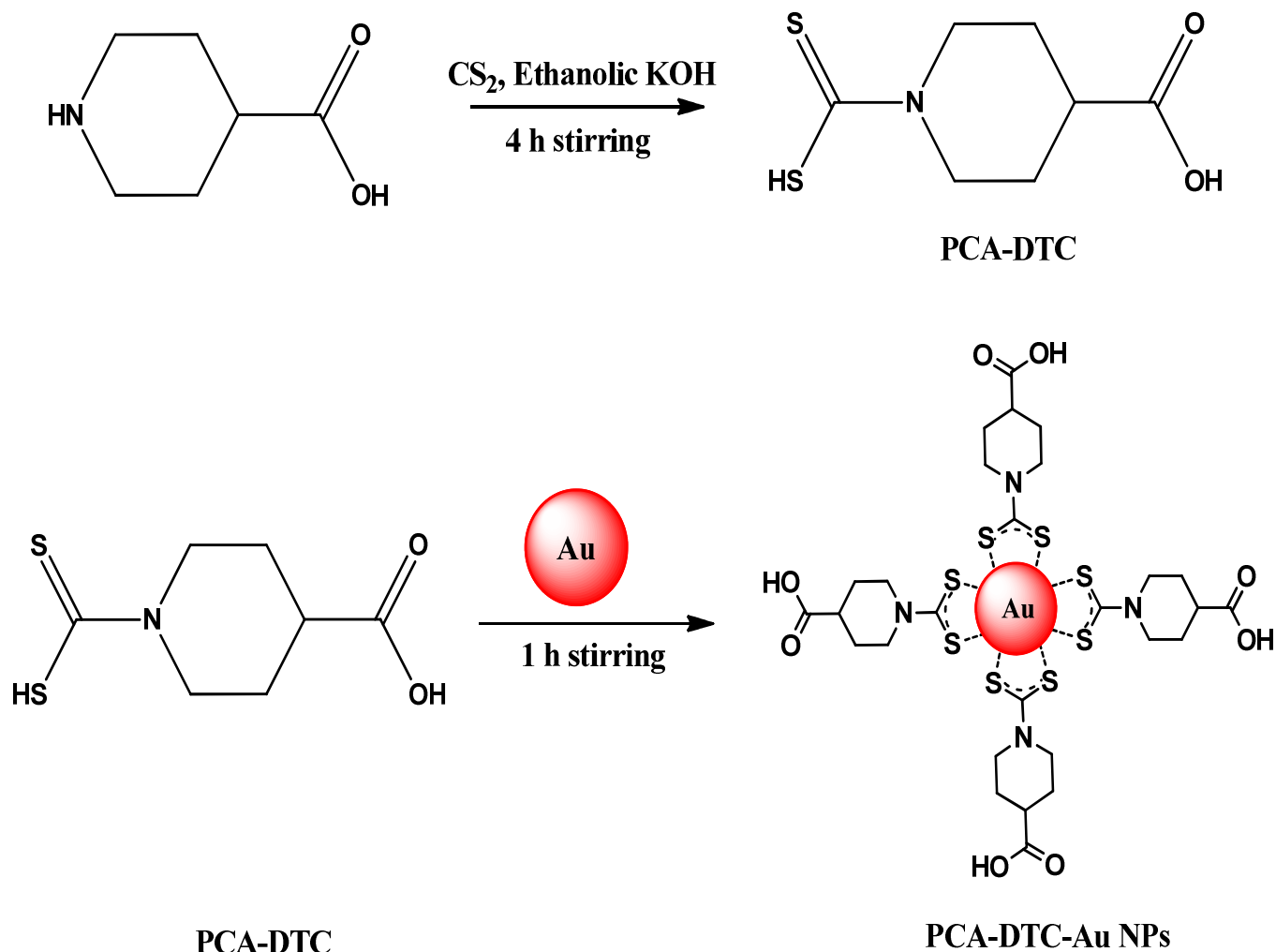


Figure S1. Synthesis procedure for the PCA-DTC and PCA-DTC-Au NPs.

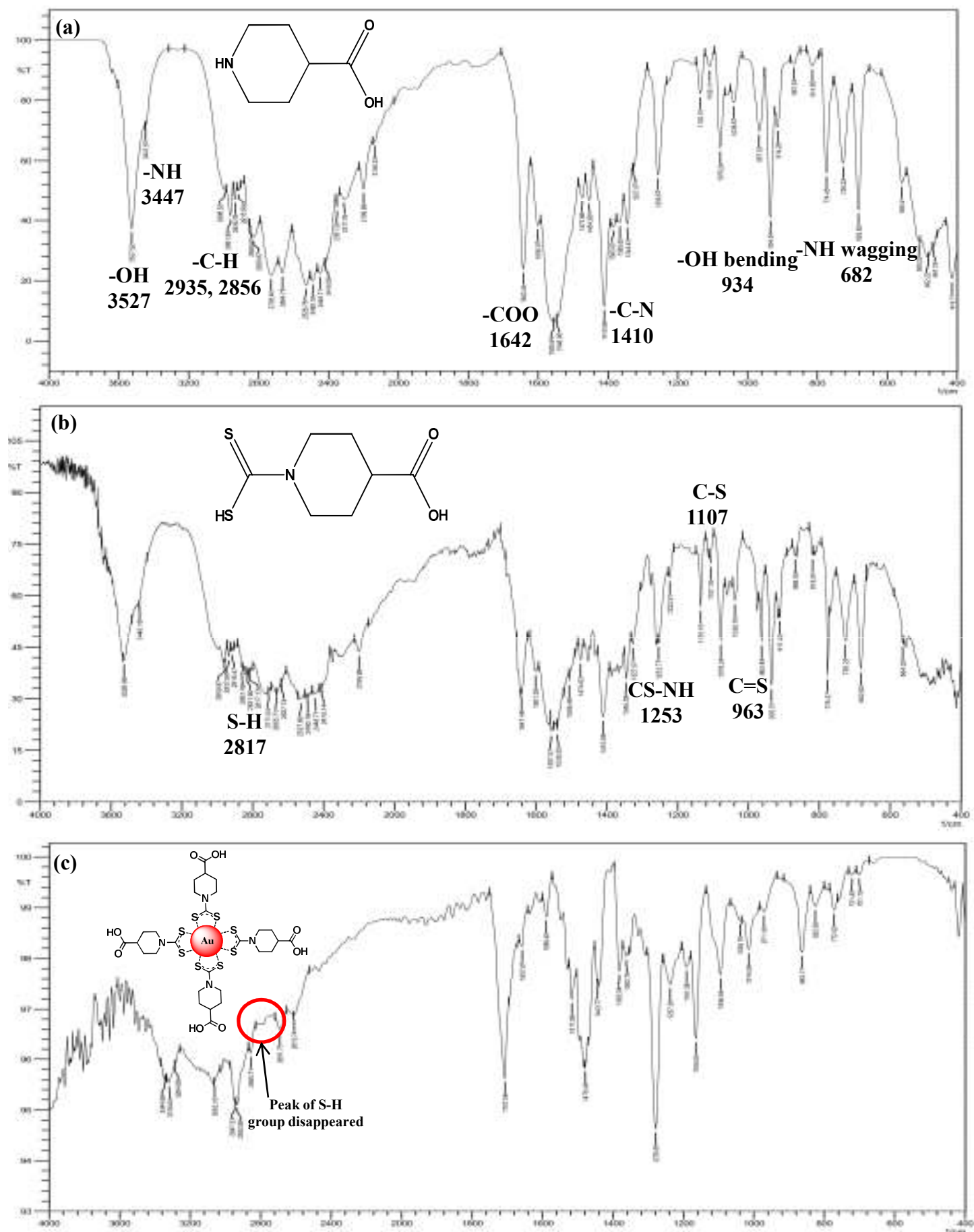


Figure S2. FT-IR spectra of (a) 4- piperidinecarboxylic acid (b) PCA-DTC and (c) PCA-DTC-Au NPs.

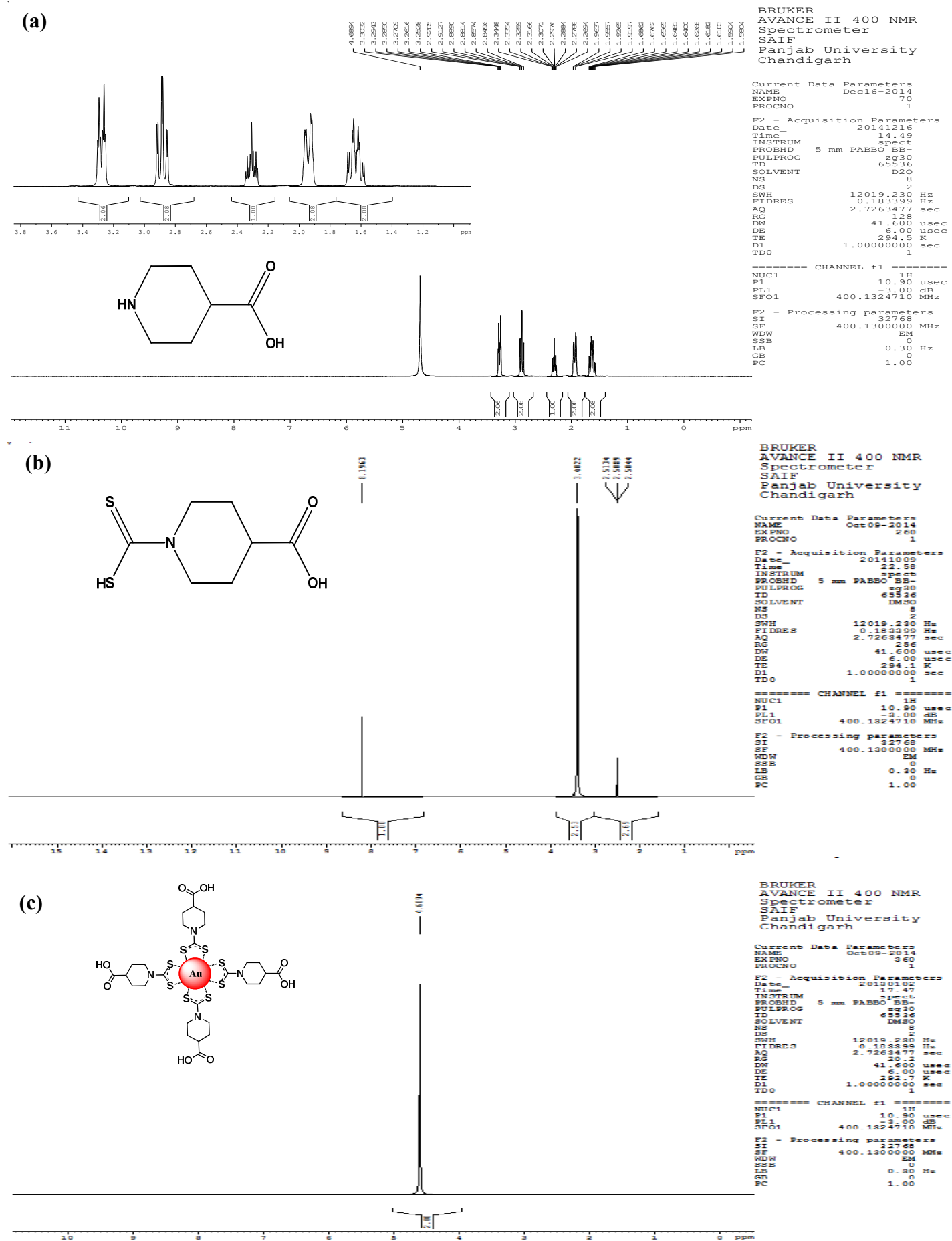


Figure S3. ^1H NMR spectra of (a) 4- piperidinecarboxylic acid (b) PCA-DTC and (c) PCA-DTC-Au NPs.

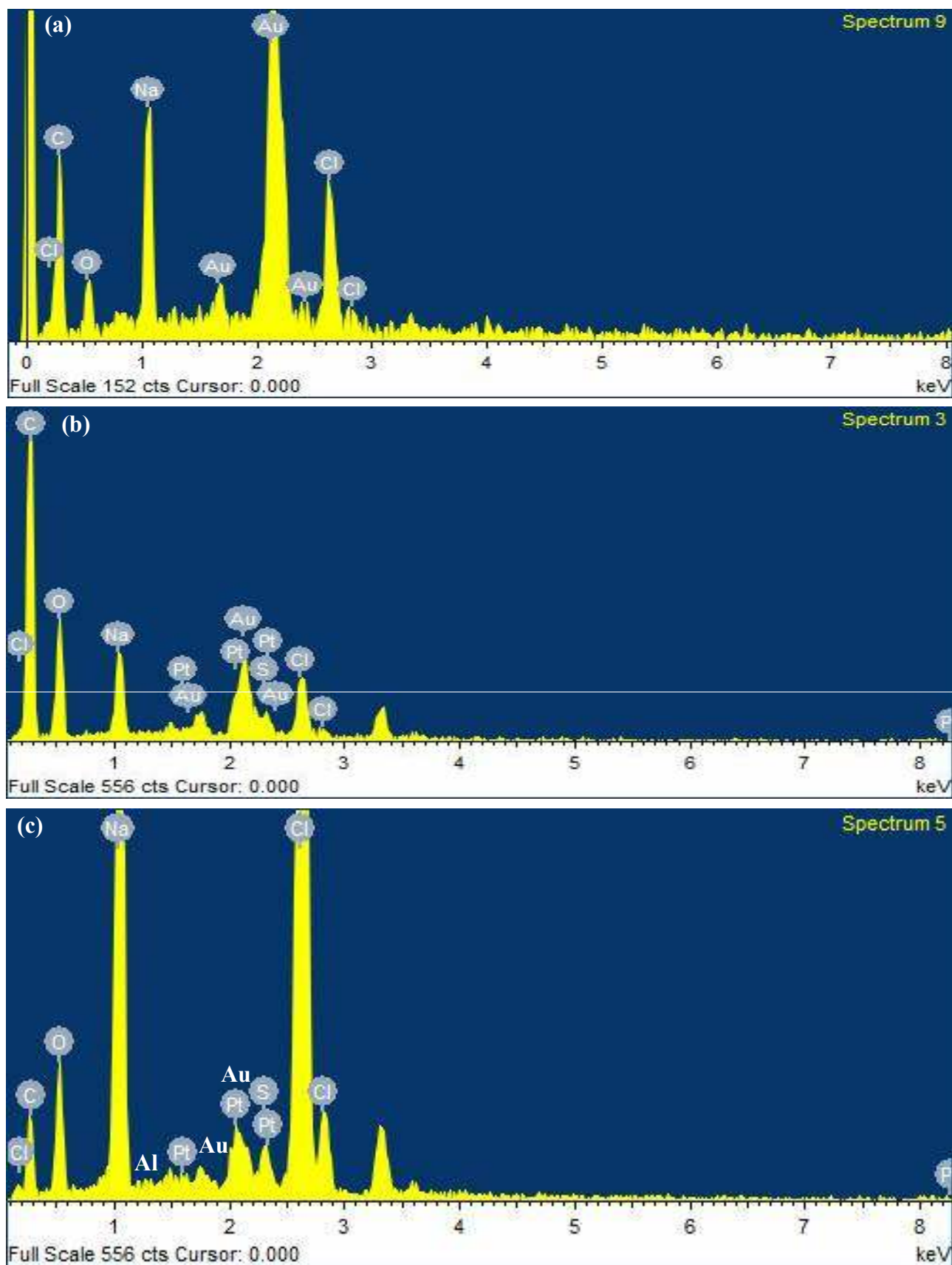


Figure S4. EDX spectra of (a) bare Au NPs (b) PCA-DTC-Au NPs and (c) Al^{3+} ion-induced aggregation of PCA-DTC-Au NPs

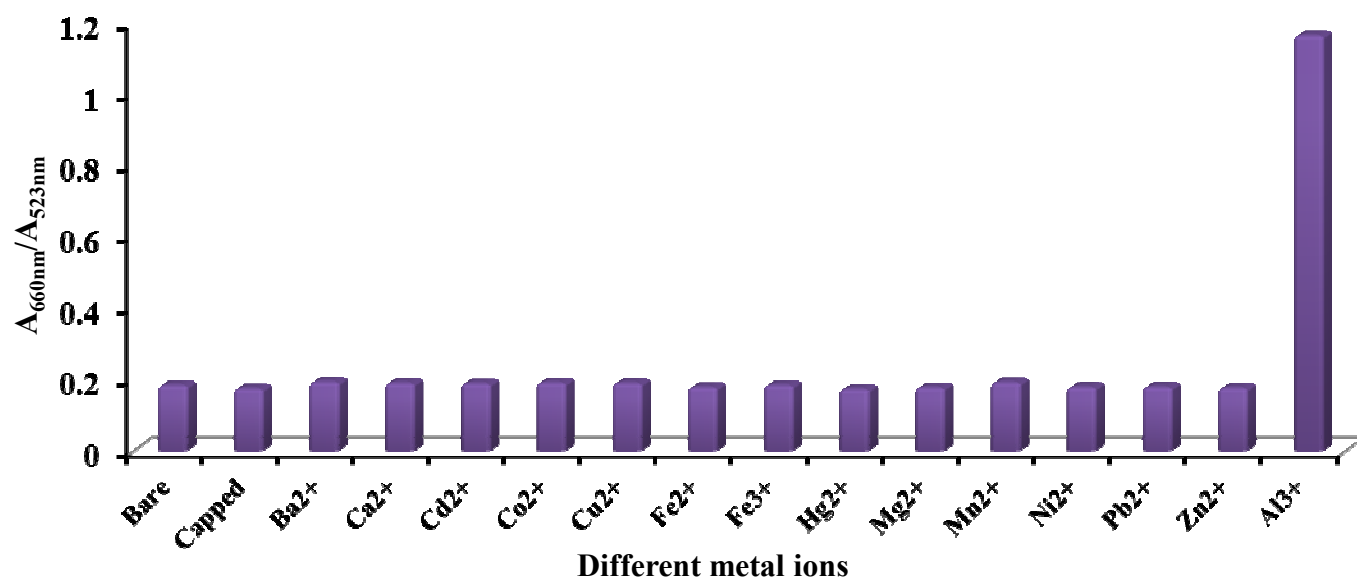
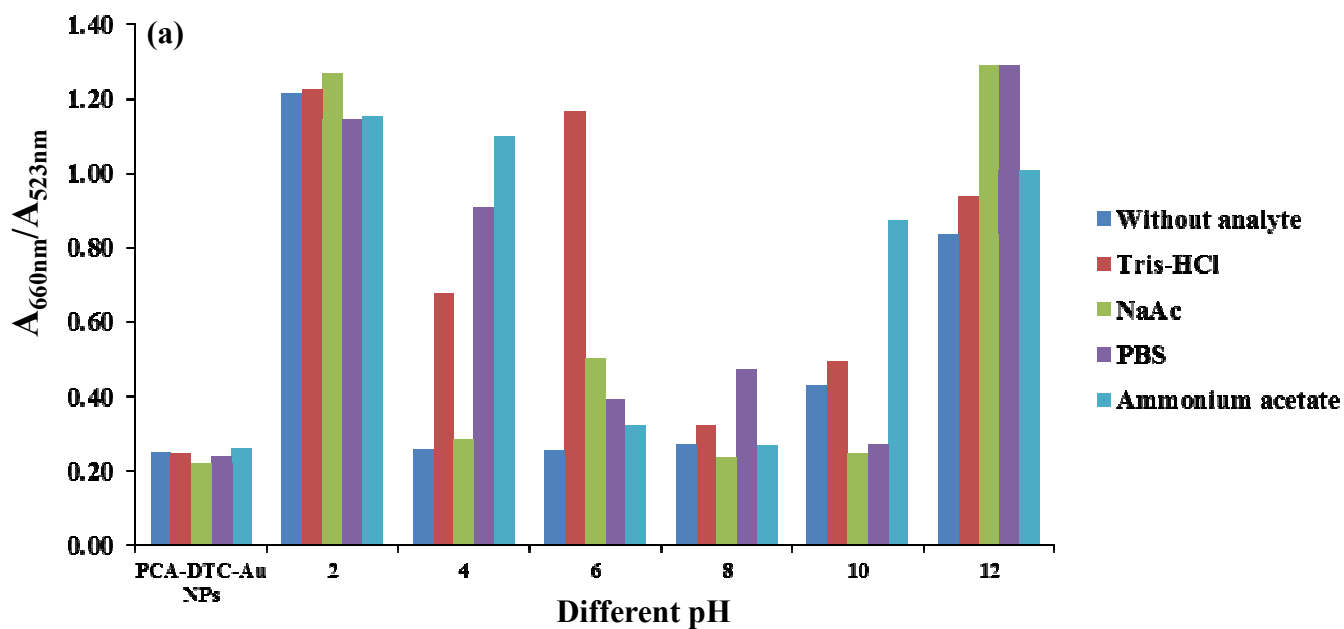


Figure S5. UV-visible absorption ratio of PCA-DTC-Au NPs at $A_{660\text{ nm}}/A_{523\text{ nm}}$ in the presence of Al^{3+} ion over other metal ions (Cu^{2+} , Co^{2+} , Cd^{2+} , Pb^{2+} , Hg^{2+} , Ni^{2+} , Mn^{2+} , Mg^{2+} , Zn^{2+} , Ba^{2+} , Ca^{2+} , Fe^{2+} , Fe^{3+}).



Without analyte



Tris-HCl



Sodium acetate



PBS



Ammonium acetate

Figure S6. (a) The absorption ratio of PCA-DTC-Au NPs at $A_{660\text{ nm}}/A_{523\text{ nm}}$ after addition of Al^{3+} ion (100 μM) in presence of different buffers (Tris-HCl, NaAc, PBS, ammonium acetate) at pH 2.0-12. (b) Photographic images of PCA-DTC-Au NPs in presence of Tris-HCl at pH 2.0-12 without addition of analyte and with addition of Al^{3+} ion (100 μM) in presence of (c) Tris-HCl (d) NaAc (e) PBS and (f) ammonium acetate at pH 2.0-12.

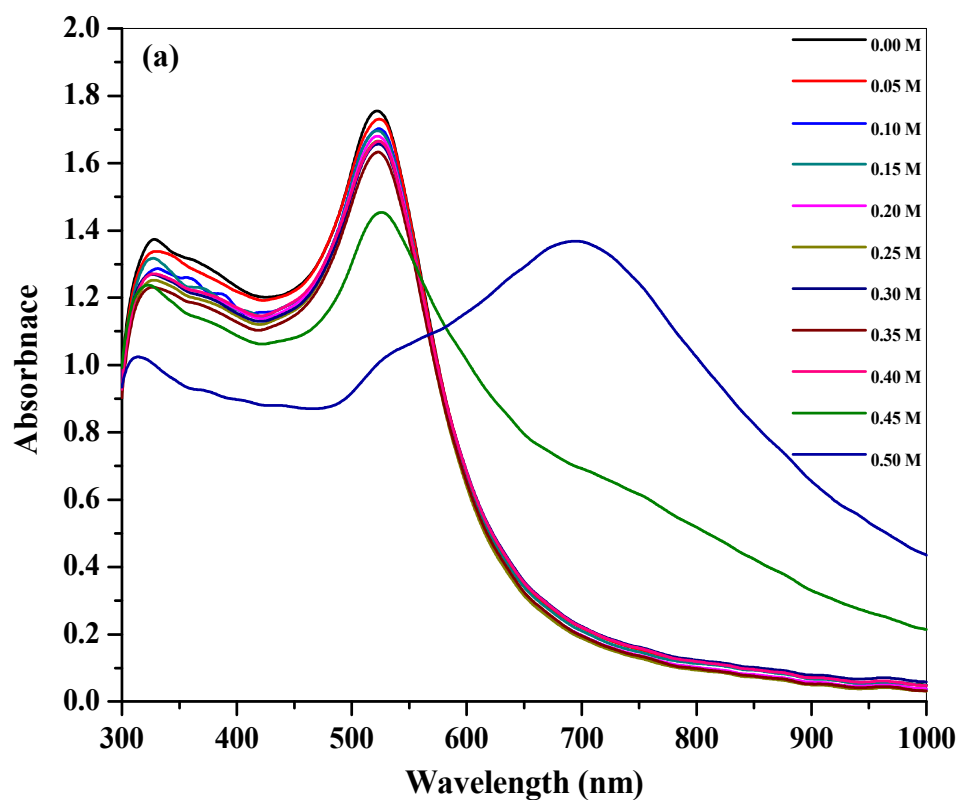


Figure S7. (a) UV-visible absorption spectra of PCA-DTC-Au NPs in the presence of different concentrations of NaCl (0.05 to 0.50 M). (b) photographic image of PCA-DTC-Au NPs after addition of different concentrations of NaCl (0.05 to 0.50 M).

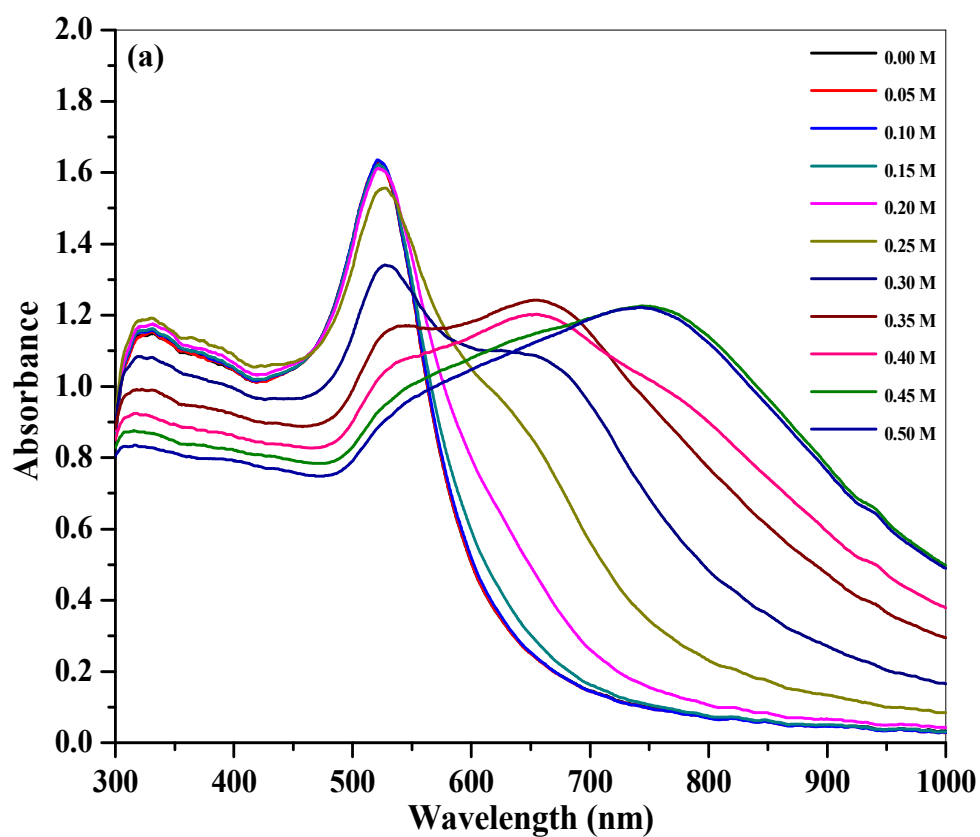


Figure S8. (a) UV-visible absorption spectra of PCA-DTC-Au NPs in the presence of different concentrations of NaCl (0.05 to 0.50 M) along with 100 μM of Al^{3+} ion. (b) photographic image of PCA-DTC-Au NPs after addition of different concentrations of NaCl (0.05 to 0.50 M) along with 100 μM of Al^{3+} ion.

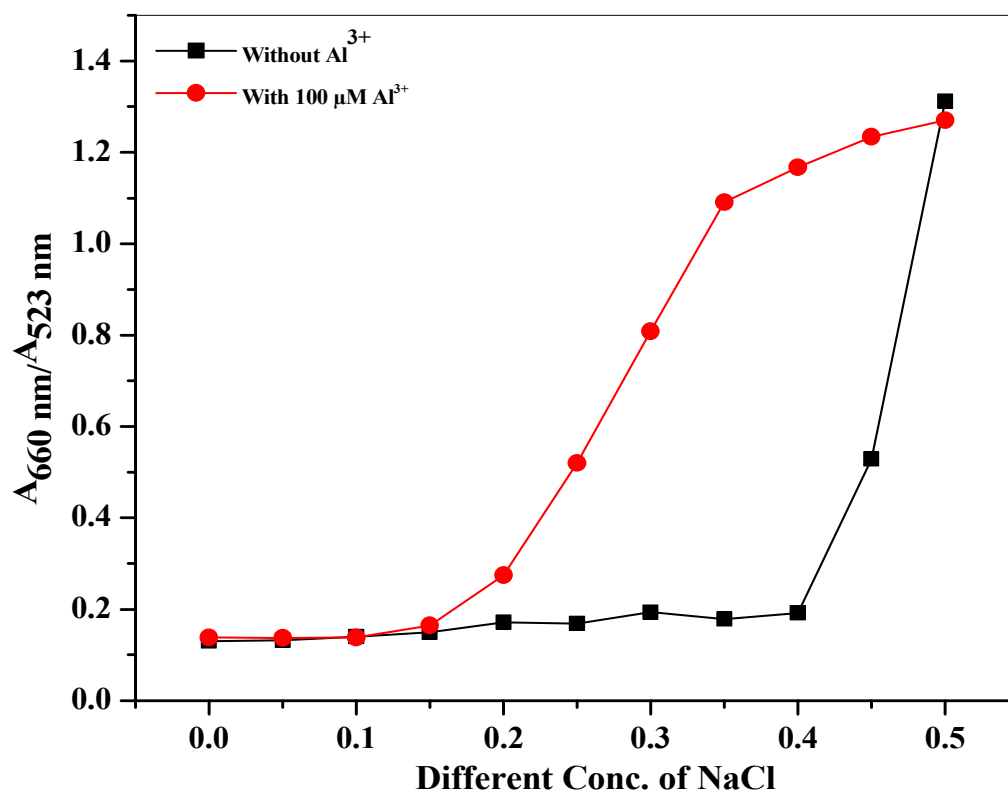


Figure S9. The absorption ratio of PCA-DTC-Au NPs at $A_{660 \text{ nm}}/A_{523 \text{ nm}}$ before and after addition of 100 μM Al^{3+} ion in presence of different concentration of NaCl (0.05 to 0.50 M)

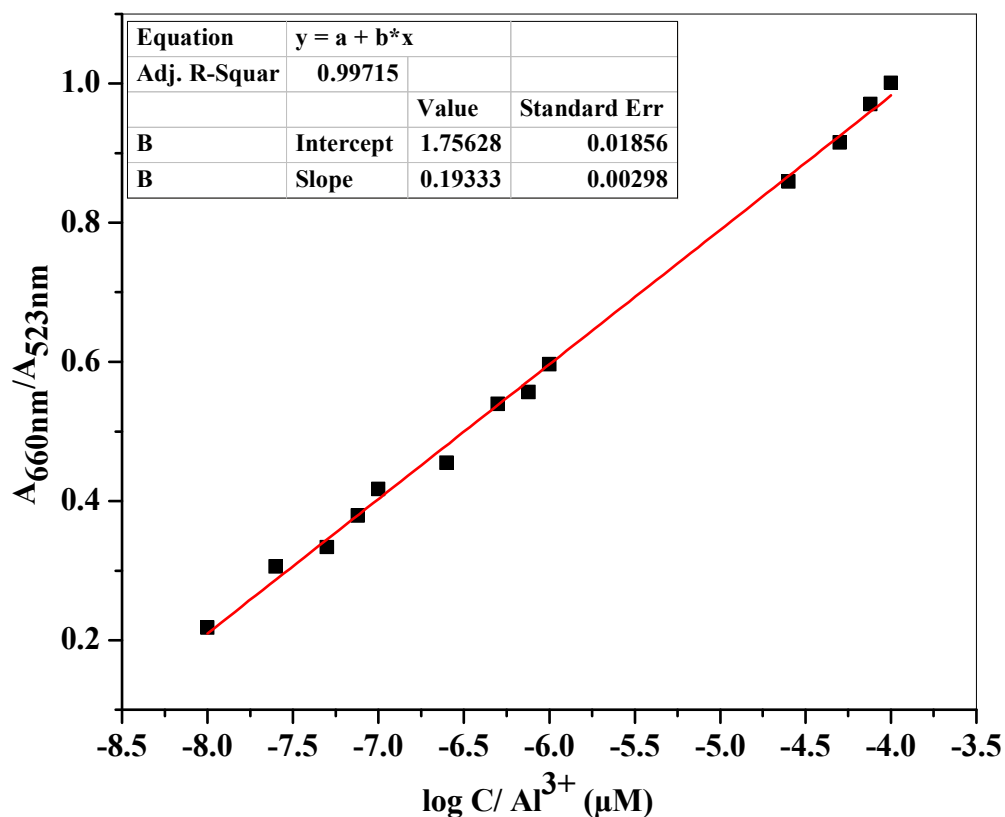


Figure S10. Calibration graph plotted between the absorption ratio at $A_{660 \text{ nm}}/A_{523 \text{ nm}}$ and logarithm of concentration of Al^{3+} by using PCA-DTC-Au NPs as a colorimetric probe.

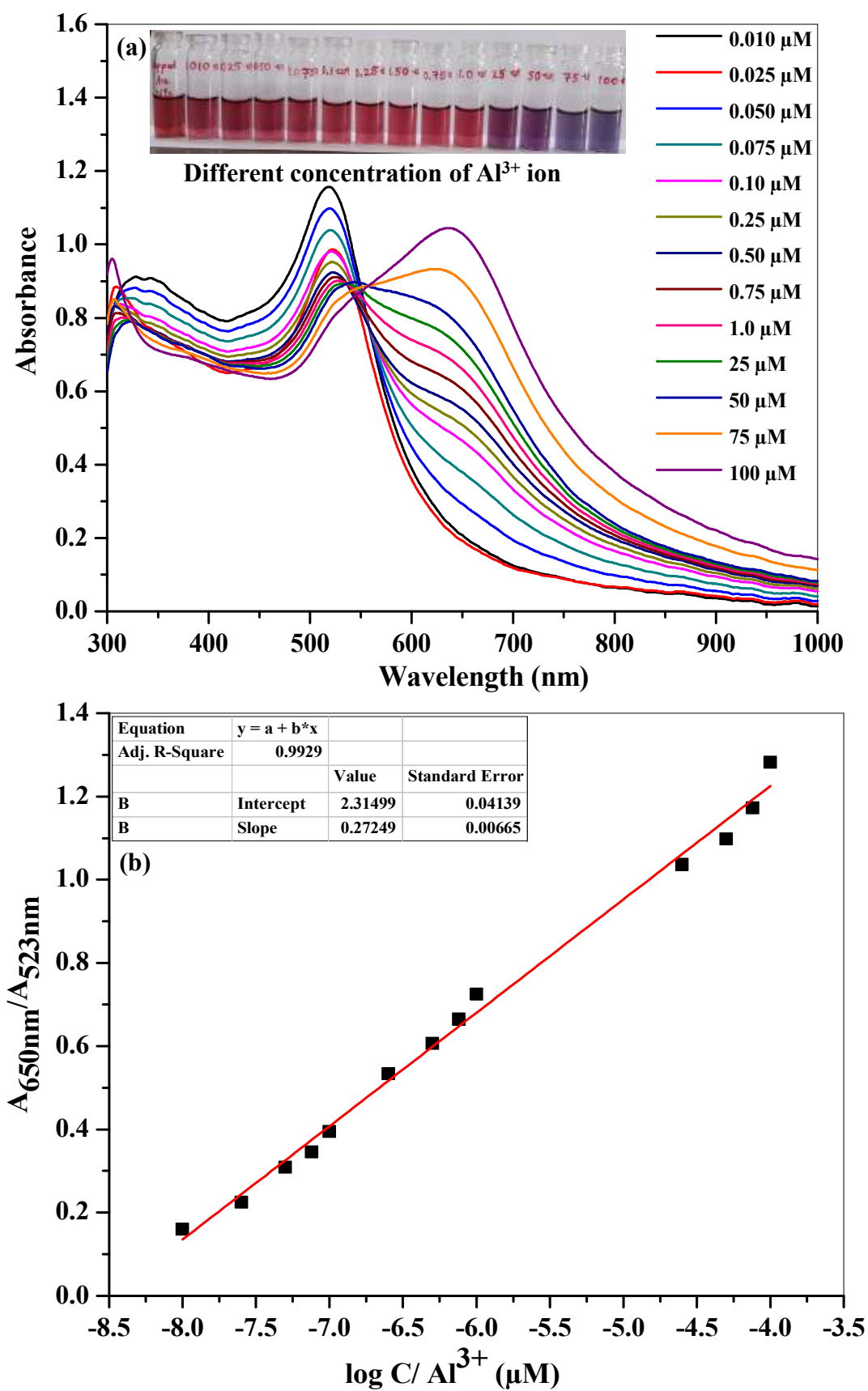


Figure S11. (a) UV-visible absorption spectra and photograph of PCA-DTC-Au NPs with different concentrations of Al^{3+} ion in the range of 0.01 to 100 μM obtained from different batch (b) Calibration graph plotted between the absorption ratio at $A_{650\text{nm}}/A_{523\text{nm}}$ and logarithm of concentration of Al^{3+} by using PCA-DTC-Au NPs from the different batch.