Electronic Supplementary Material (ESI) for RSC Advances

Supporting Information

Anion-driven selective colorimetric detection of Hg^{2+} and Fe^{3+} using functionalized silver nanoparticles

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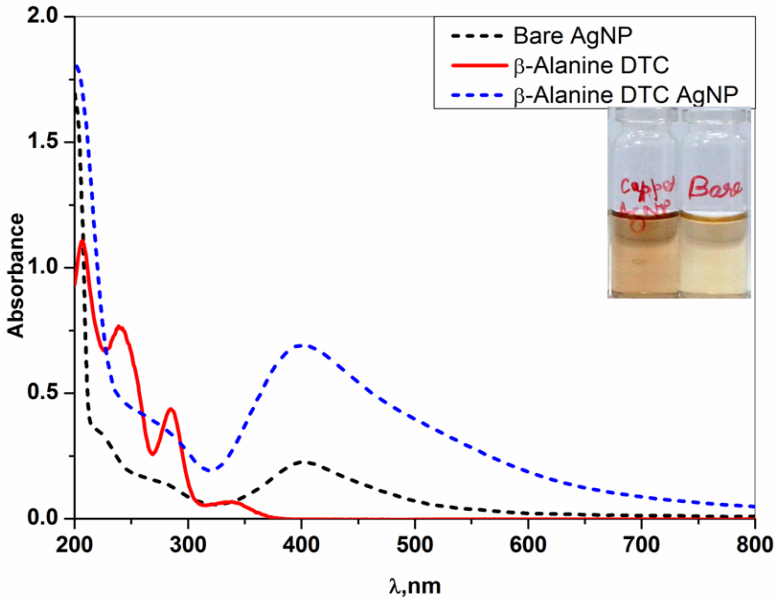

Fig. 1S. UV-Vis spectra of β–Alanine Dithiocarbamate, bare AgNPs and β–Alanine Dithiocarbamate modified AgNPs. Inset: Photographic image of bare AgNPs and β –Alanine Dithiocarbamate modified AgNPs.

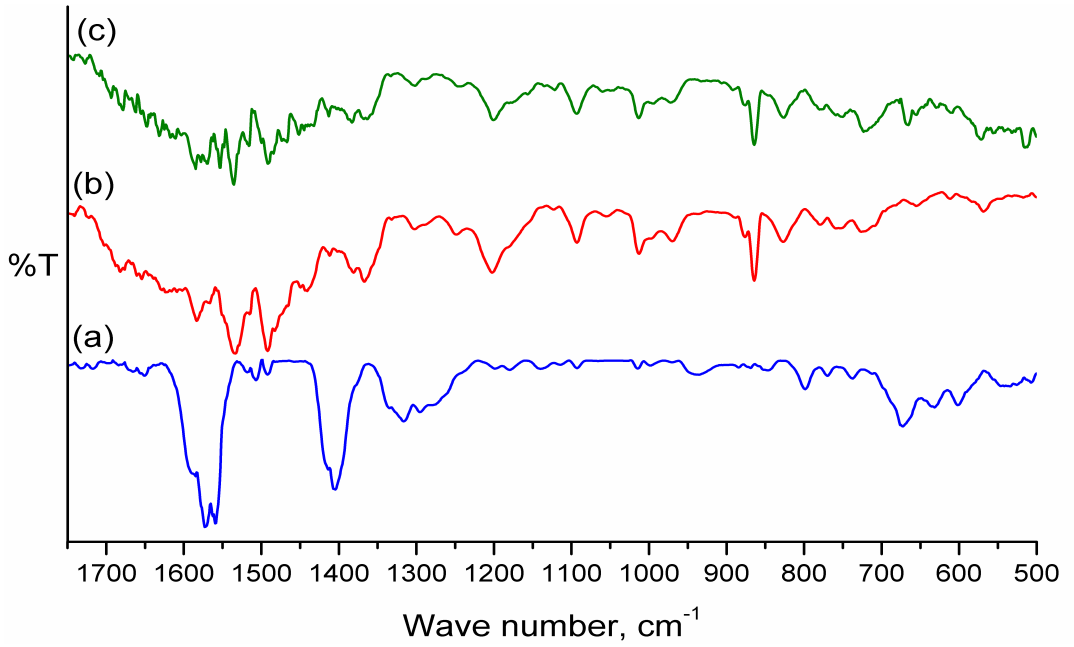

Fig. 2S. FT-IR Spectra of (a) β-Alanine Dithiocarbamate (ADTC), (b) ADTC functionalized AgNPs and (c) ADTC functionalized AgNPs in the presence of Hg^{2+}.

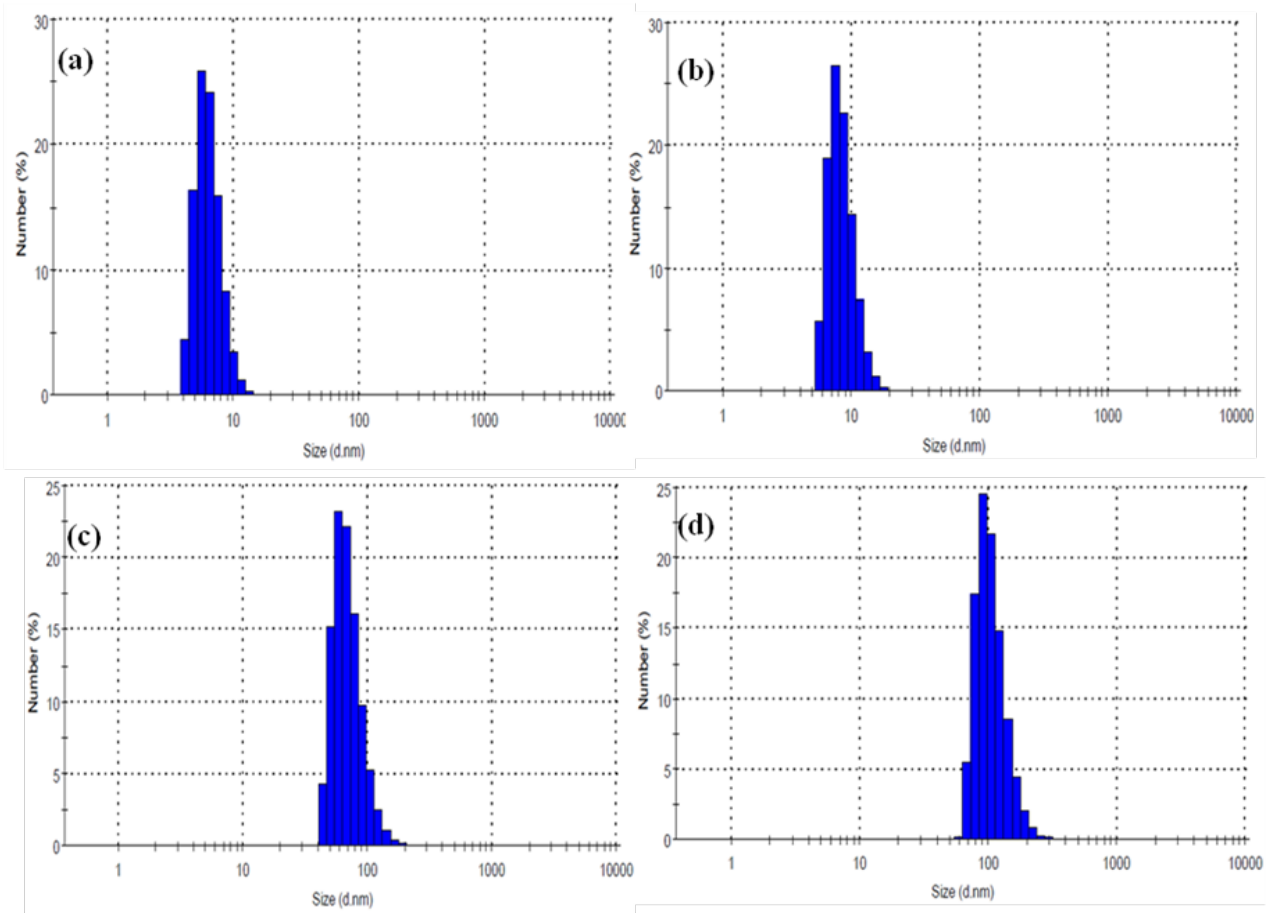

Fig. 3S. DLS data of (a) β–Alanine Dithiocarbamate modified AgNPs (b) β–Alanine Dithiocarbamate modified AgNPs in the presence of 10mM NaCl (c) β–Alanine Dithiocarbamate modified AgNPs in presence of Hg^{2+} (d) β–Alanine Dithiocarbamate modified AgNPs in presence of Fe^{3+}.

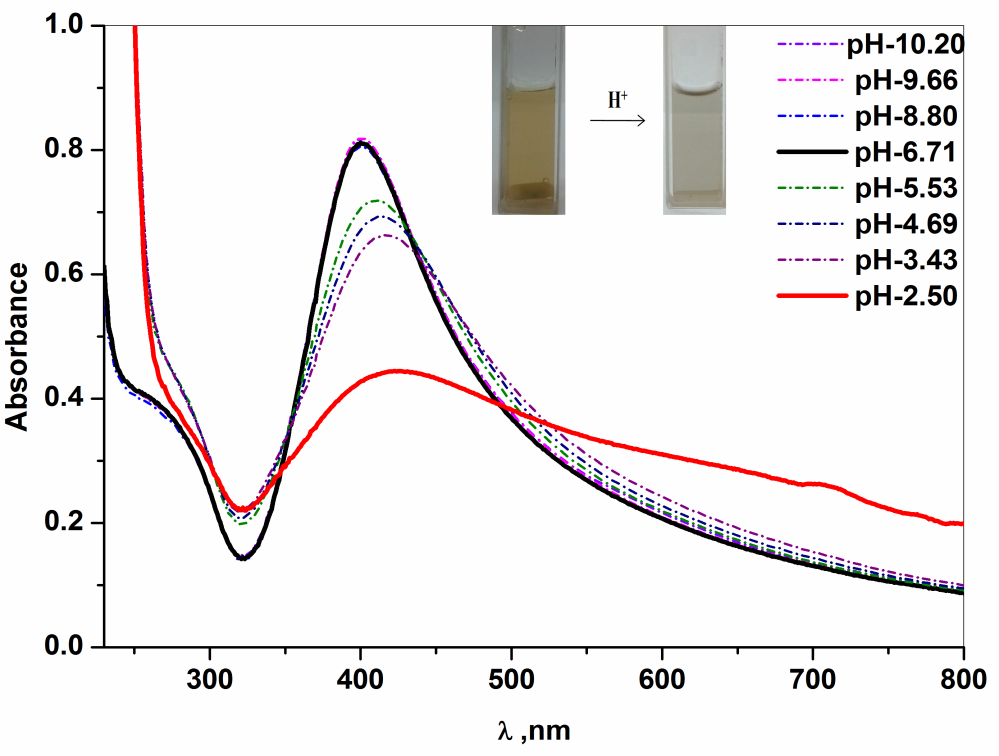

Fig. 4S. UV-Vis spectral observations of ADTC functionalized AgNPs at different pH. Inset shows the color change of AgNPs from yellow (pH of AgNPs = 6.71) to colorless (pH = 2.50).

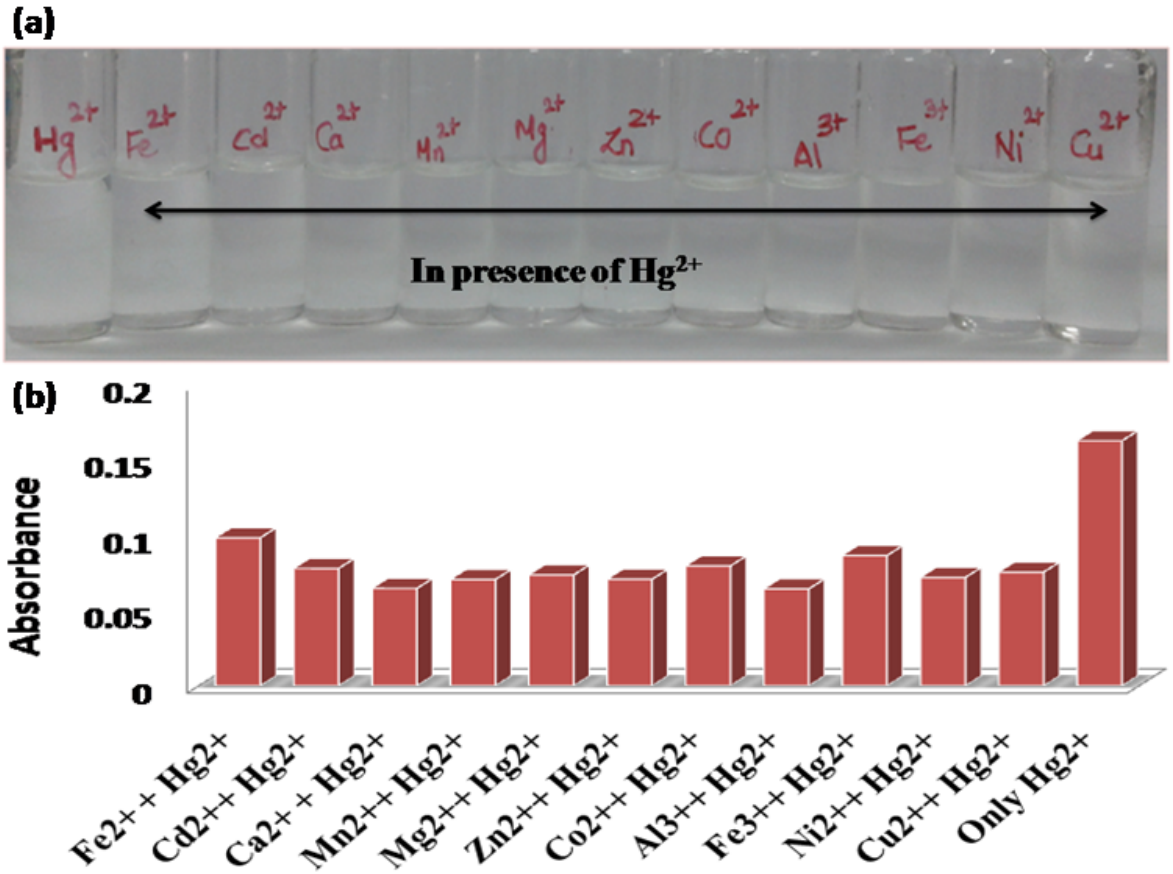

Fig. 5S. Interference for the detection of Hg^{2+} in the presence of equimolar amount of other metal ions.

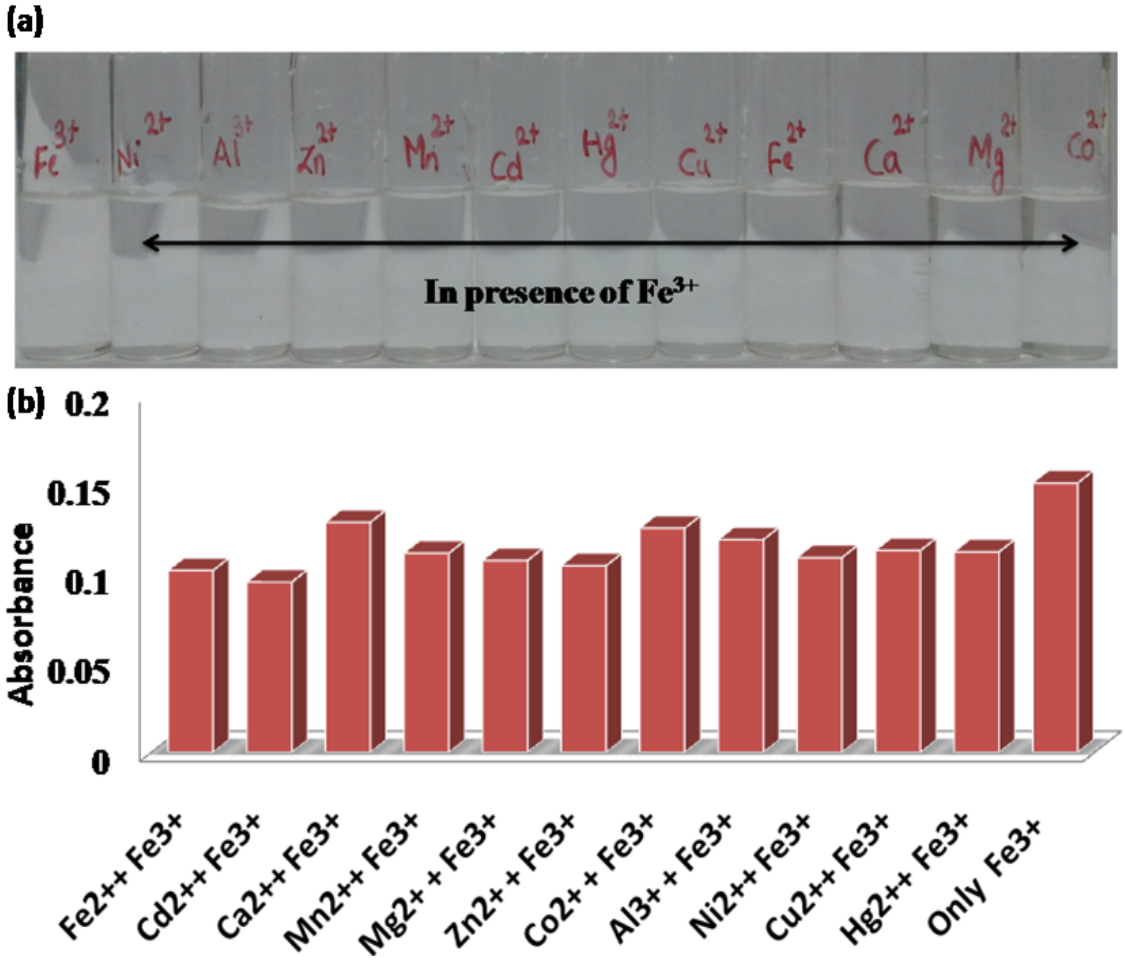

Fig. 6S. Interference for the detection of Fe^{3+} in the presence of equimolar amount of other metal ions.

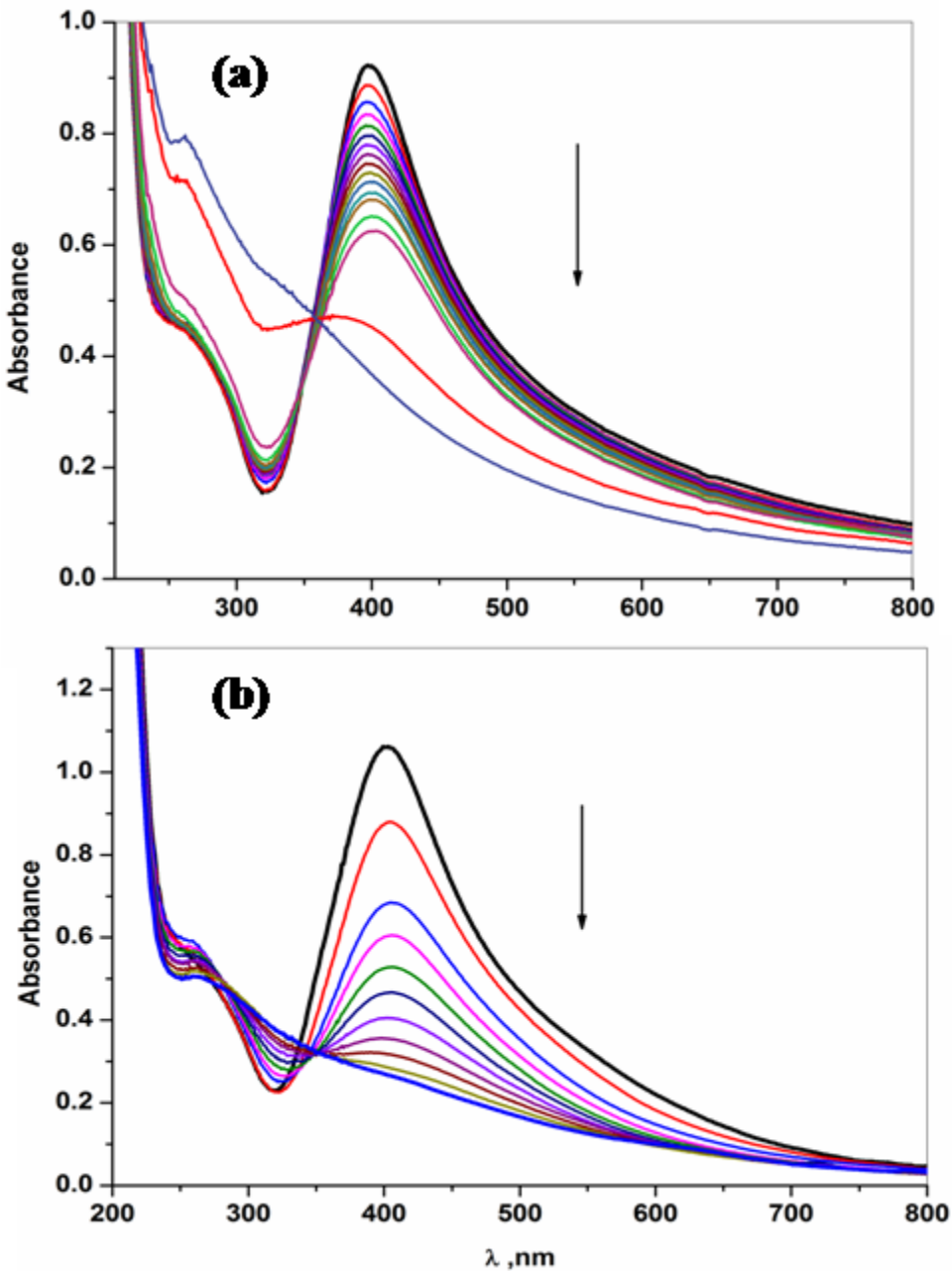

Fig. 7S. UV-Vis spectra of the functionalized AgNPs at various concentrations of (a) Hg^{2+} from 4.97×10^{-6} to 7.4×10^{-5} M and (b) Fe^{3+} from 4.97×10^{-6} to 5.66×10^{-5} M.

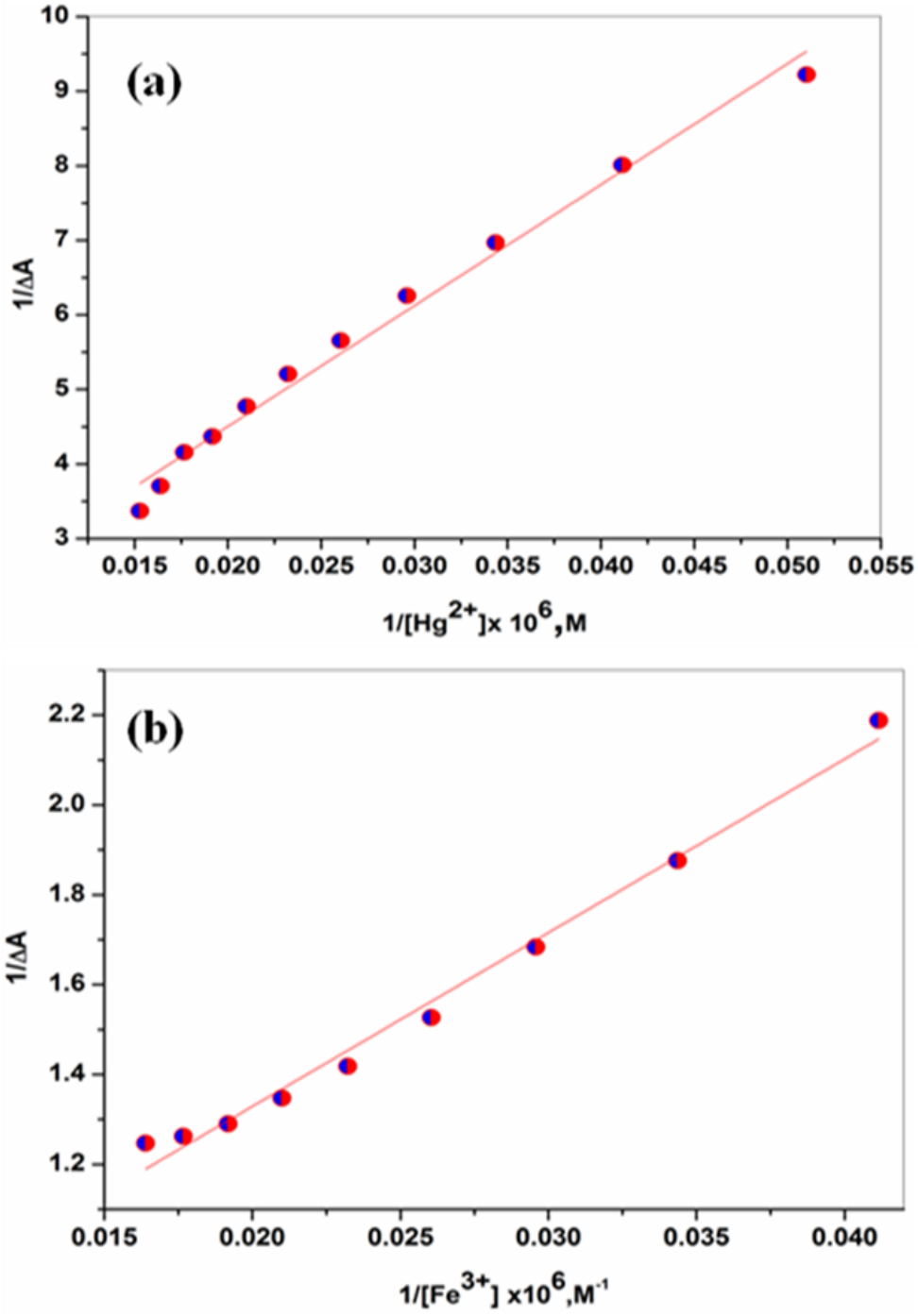

Fig. 8S. Benesi–Hildebrand plots for β-Alanine Dithiocarbamate functionalized AgNPs in the presence of (a) Hg^{2+} [4.97×10^{-6} -7.4×10^{-5} M] and (b) Fe^{3+} [4.97×10^{-6} - 5.66×10^{-5} M] ions.

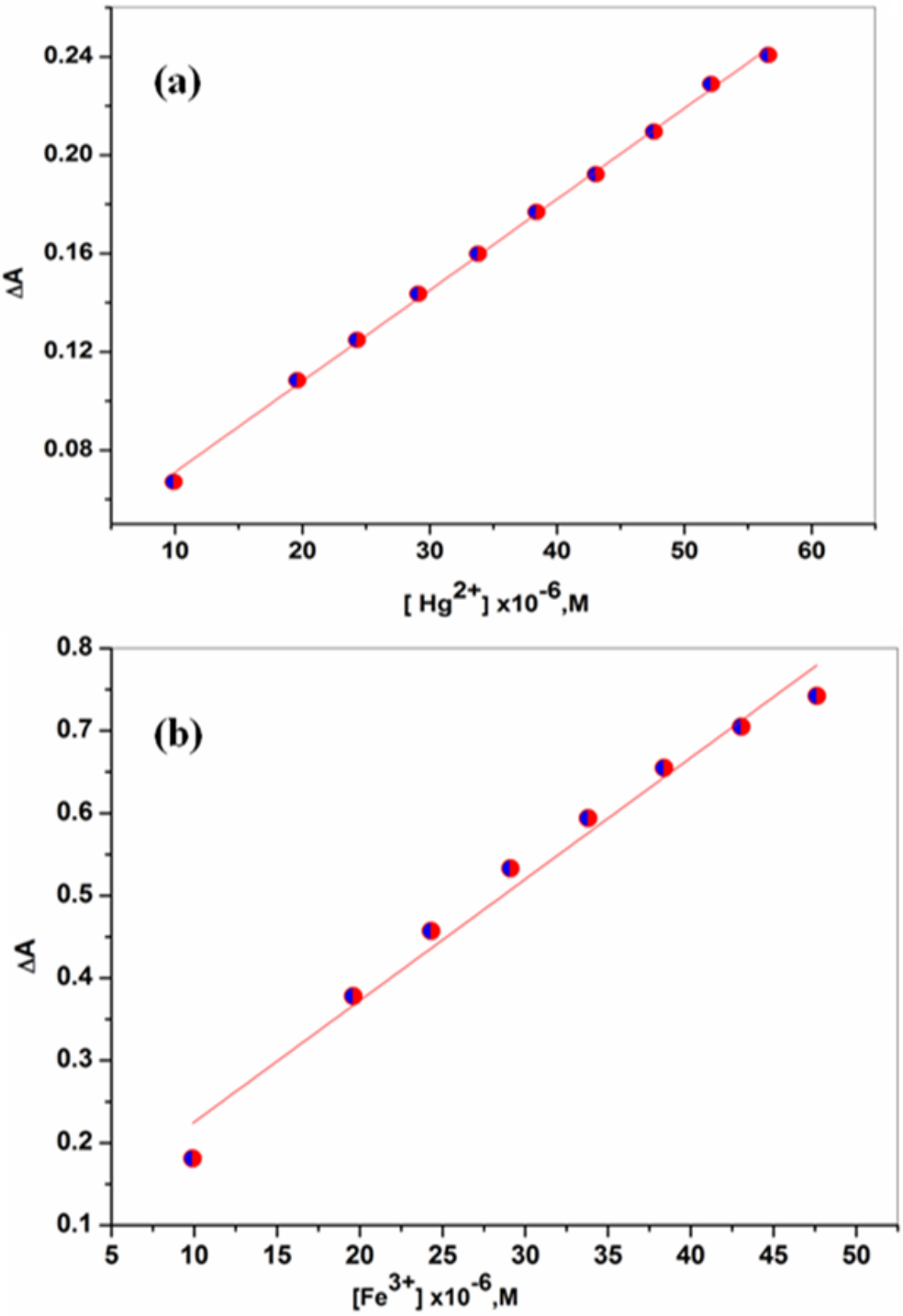

Fig. 9S. Calibration curve for quantification of (a) Hg^{2+} and (b) Fe^{3+} using β-Alanine Dithiocarbamate functionalized AgNPs.

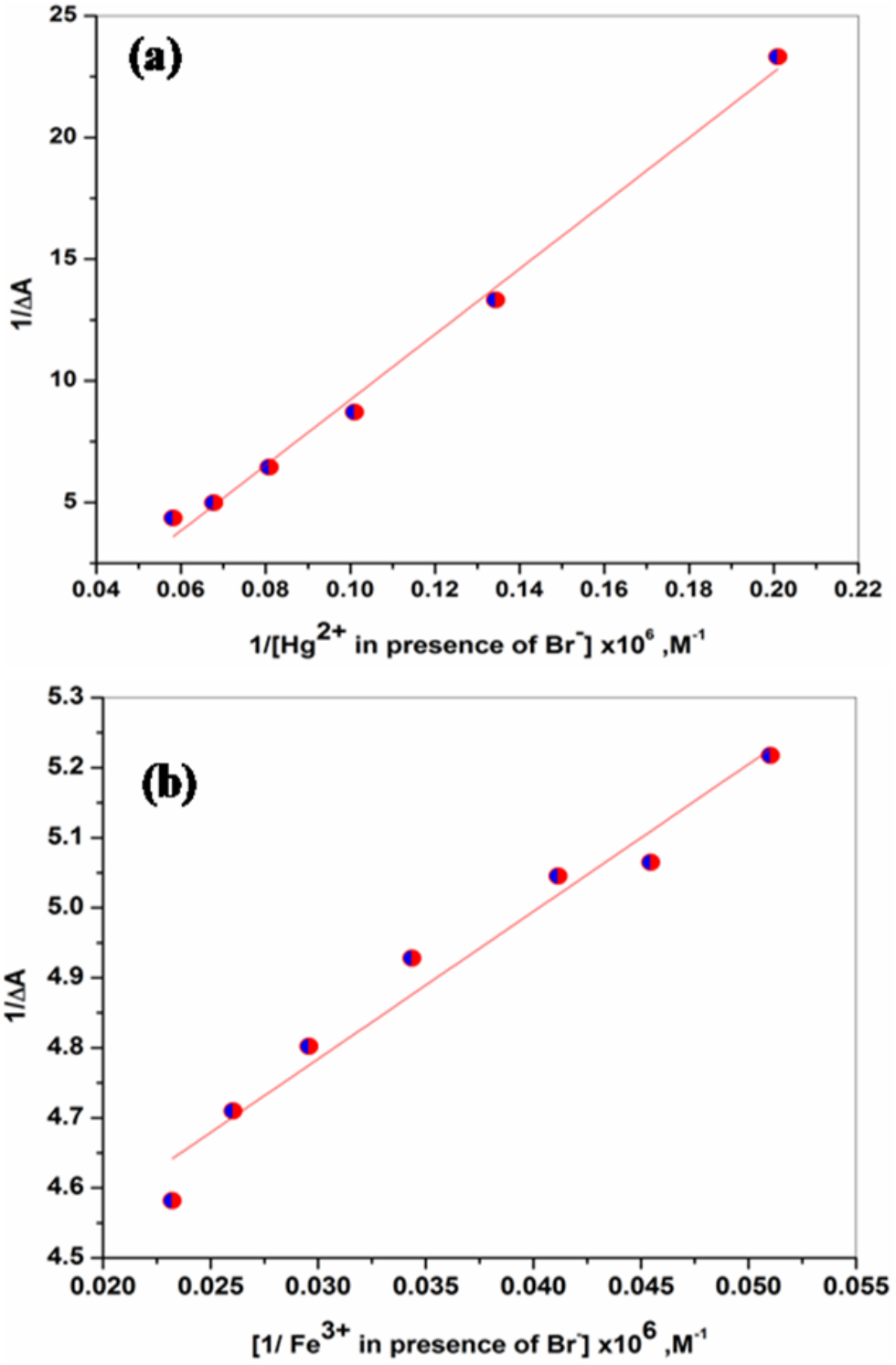

Fig. 10S. Benesi–Hildebrand plots for β – Alanine Dithiocarbamate functionalized AgNPs in the presence of (a) Hg^{2+} in presence of $Br^-$and (b) Fe^{3+} in presence of Cl^-.

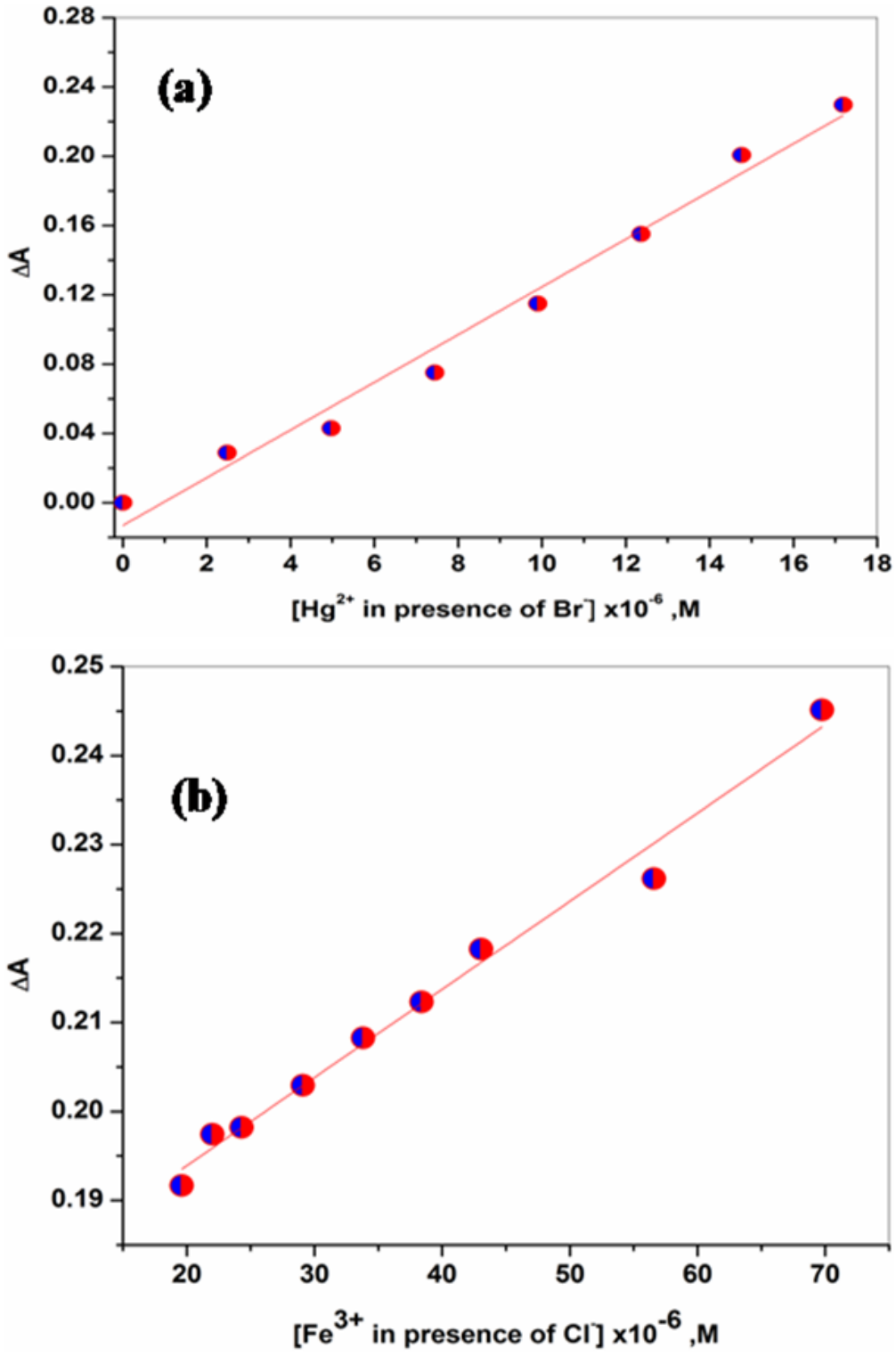

Fig. 11S.Calibration curve for quantification of (a) Hg^{2+} in presence of $Br^-$and (b) Fe^{3+} in presence of Cl^- using β - Alanine Dithiocarbamate functionalized AgNPs.

Table 1S. DLS: variation in the average hydrodynamic diameter of AgNPs on addition of different concentration of Hg^{2+} and Fe^{3+} (1.0 X 10^{-3} M).

Sr. No.	**Samples**	**hydrodynamic diameter, d (nm)**
1.	ADTC functionalized AgNPs	5.615
2.	ADTC functionalized AgNPs + 100µl Hg^{2+}	58.77
3.	ADTC functionalized AgNPs + 200µl Hg^{2+}	78.82
4.	ADTC functionalized AgNPs + 50µl Fe^{3+}	68.06
5.	ADTC functionalized AgNPs + 100µl Fe^{3+}	91.28

Table 2S. Comparison of the present AgNPs system for the detection of Hg^{2+} and Fe^{3+} with the previously reported methods.

AgNPs systems	SPR band	LOD	References
Hg^{2+}			
ADTC- AgNPs	402 nm	4.89 μM	**Present Study**
ADTC- AgNPs in presence of Br^-	402 nm	2.54 μM	**Present Study**
p-phenylenediamine functionalized AgNPs	411 nm	0.80 μM	[1]
Unmodified AgNPs	408 nm	2.2 μM	[2]
Starch stabilized AgNPs	390 nm	~5 ppb	[3]
Citrate Capped AgNPs	394 nm	6.6 nM	[4]
Adenosine monophosphate capped AgNPs	423 nm	0.5 nM	[5]
Fe^{3+}			
ADTC- AgNPs	402 nm	6.18 μM	**Present Study**
ADTC- AgNPs in presence of Cl^-	402 nm	6.08 μM	**Present Study**
p-phenylenediamine functionalized AgNPs	411 nm	1.29 μM	[1]
Calix[4]arene stabilized AgNPs	414 nm	Micromolar	[6]

References

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