Electronic Supplementary Information

Effect of Surface Engineering on Ethylamine-Mediated Plasmonic Gold Nanoparticles Assembly

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Table S1. Optical performance of the reaction products obtained by assembling AuNPs of 15 nm in diameter with ethylamine in aqueous solution and different proportions of water/ethanol mixture.

Water/ethanol mixture (v:v)	Transverse surface plasmon resonance peak (nm)	Longitudinal surface plasmon resonance peak (nm)
5:95	520±0.0	580±2.0
20:80	520±0.0	600±4.0
40:60	520±0.0	626±2.0
60:40	526±2.0	666±4.0
80:20	526±2.0	686±6.0
100:0	522±2.0	716±4.0

Table S2. Optical performance of the reaction products obtained by assembling AuNPs of 15 nm in diameter with different initial concentrations of EA ($[EA]_0$) in water/ethanol mixture (v:v=20:80) for 40 min.

Initial ethylamine concentration ($[EA]_0$) (mM)	Transverse surface plasmon resonance peak (nm)	Longitudinal surface plasmon resonance peak (nm)
8.5	520±0.0	594±2.0
17.0	520±0.0	610±4.0
25.5	522±2.0	650±2.0
42.5	522±2.0	698±4.0

85.0	522±0.0	706±4.0
170.0	522±2.0	710±4.0

Table S3. Physicochemical characterization of the reaction products obtained by assembly AuNPs of 15 nm in diameter with different structural analogs of EA in water/ethanol mixture (v:v=20:80) for 40 min. The initial concentration of these analogs were equivalent to $[EA]_0$=42.5mM. Results are given in mean ± SD of 3 independent experiments. N.D." refers to any surface plasmon resonance peak not detectable by the spectrophotometer.

EA analogs	Transverse surface plasmon resonance peak (nm)	Longitudinal surface plasmon resonance peak (nm)
DEA	520±0.0	614±2.0
TEA	520±0.0	594±4.0
MEA	524±0.0	710±2.0
PAD	524±0.0	N.D.
PPA	524±0.0	N.D.

Table S4. Optical performance of the reaction products obtained by assembling AuNPs of 15 nm in diameter with diethylamine and triethylamine for different time.

Assembly reagent	Reaction time	Longitudinal surface plasmon resonance peak (nm)
DEA	60 min	644±2.0
DEA	120 min	686±4.0

TEA	36 h	614±2.0
TEA	48 h	640±4.0
TEA	72 h	678±4.0

Table S5. Optical performance of the reaction products obtained by assembling AuNPs of 15 nm in diameter with different concentration of $AgNO_3$.

Concentration (mM)	Longitudinal surface plasmon resonance peak (nm)
0.05	640±2.0
0.10	646±4.0
0.20	650±2.0
0.40	608±2.0

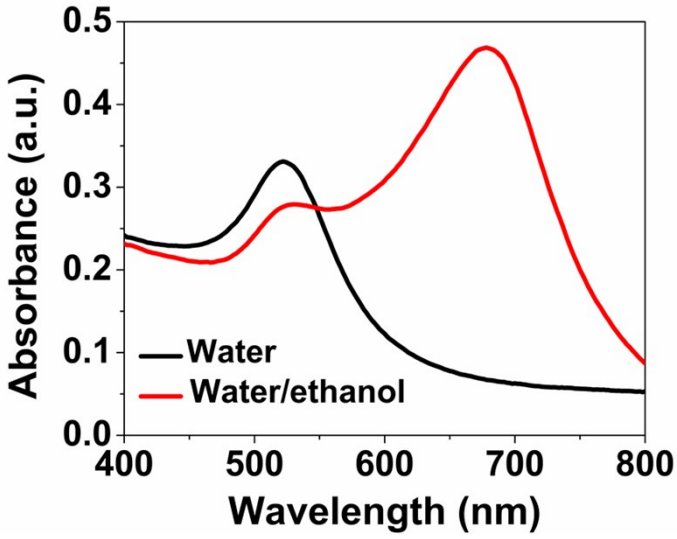

Figure S1. UV-vis spectra of the chainlike assemblies of AuNPs triggered with $NaNO_3$ in aqueous solution and water/ethanol mixture

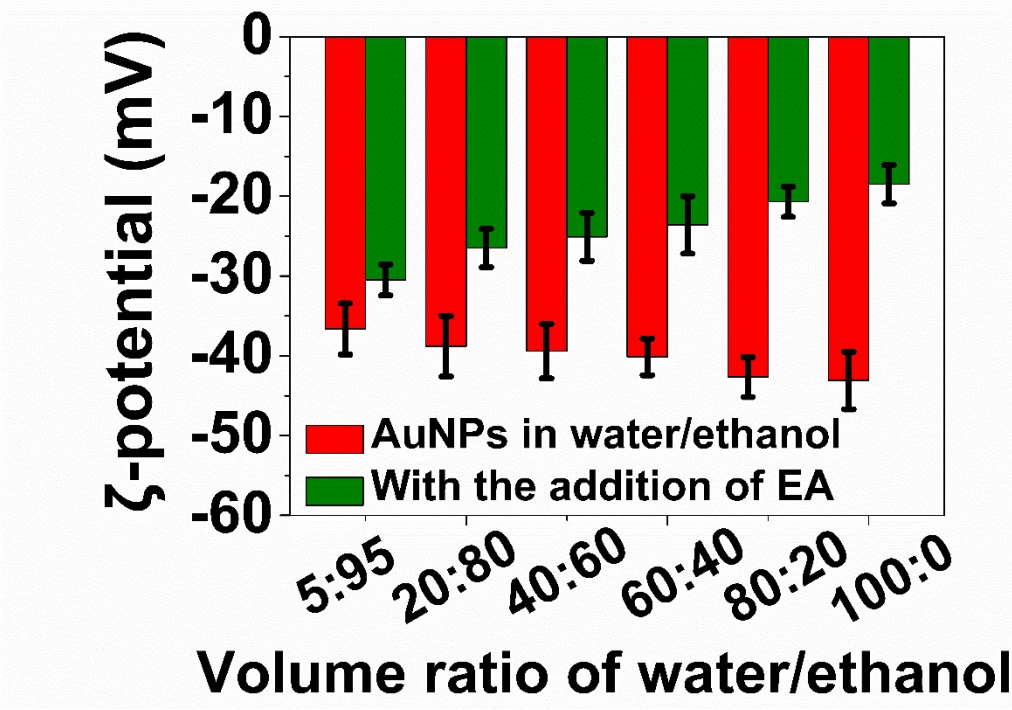

Figure S2. ζ-potential of AuNPs in water/ethanol mixture of different ratios.

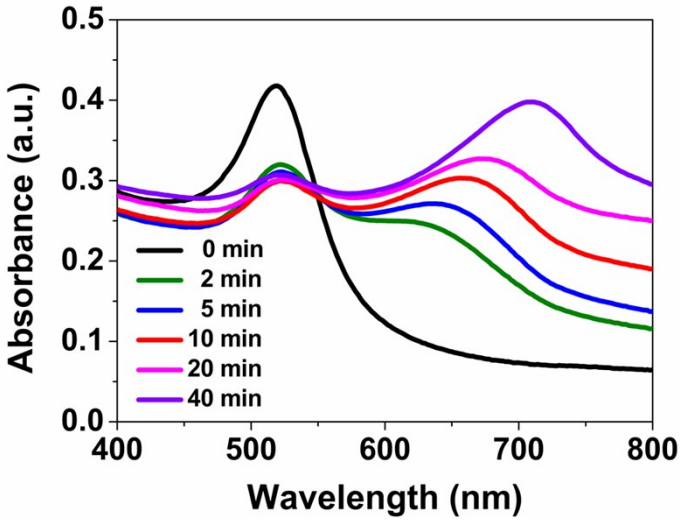

Figure S3. UV-vis spectra of the chainlike assemblies of AuNPs induced with 85 mM EA for different time

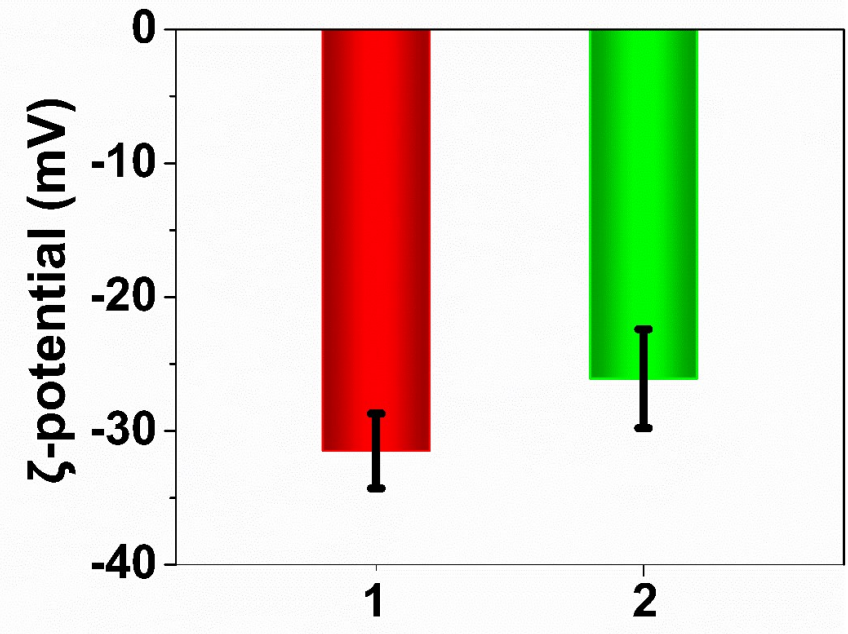

Figure S4. ζ-potential of the chainlike assemblies of AuNPs triggered with $NaNO_3$ in aqueous solution (1) and water/ethanol mixture (2).

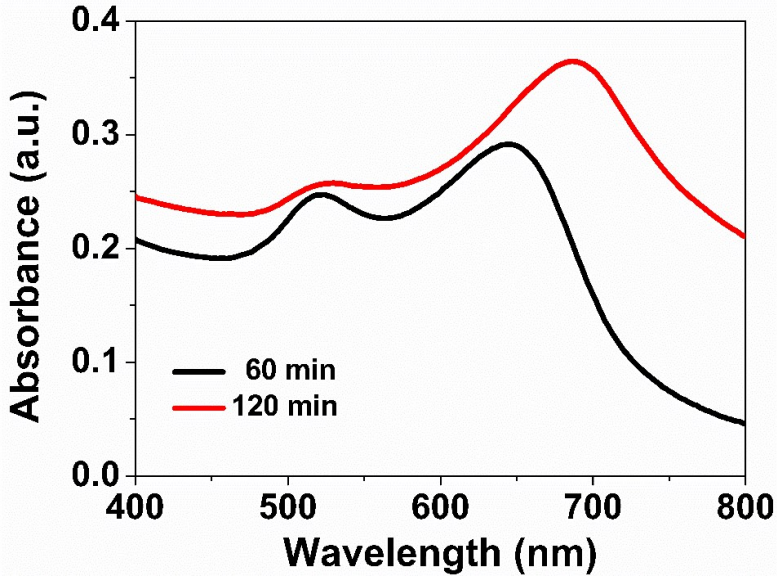

Figure S5. UV-Vis spectra of AuNPs assembled with DEA for 60 min and 120 min.

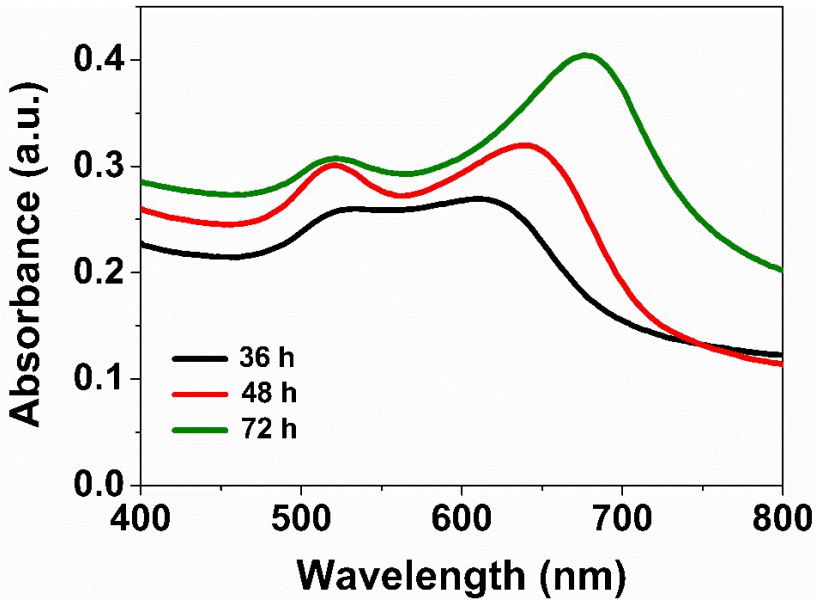

Figure S6. UV-vis spectra of AuNPs assembled with TEA for 36 h, 48 h and 72 h.

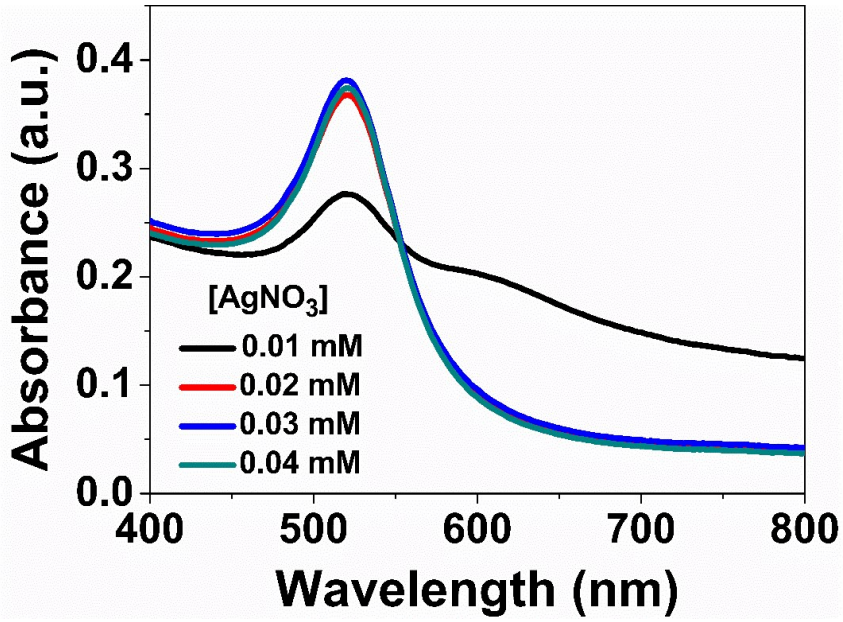

Figure S7. UV-vis spectra of AuNPs assembled with EA upon addition of different concentrations of $AgNO_3$ between 0.01 to 0.04 mM.

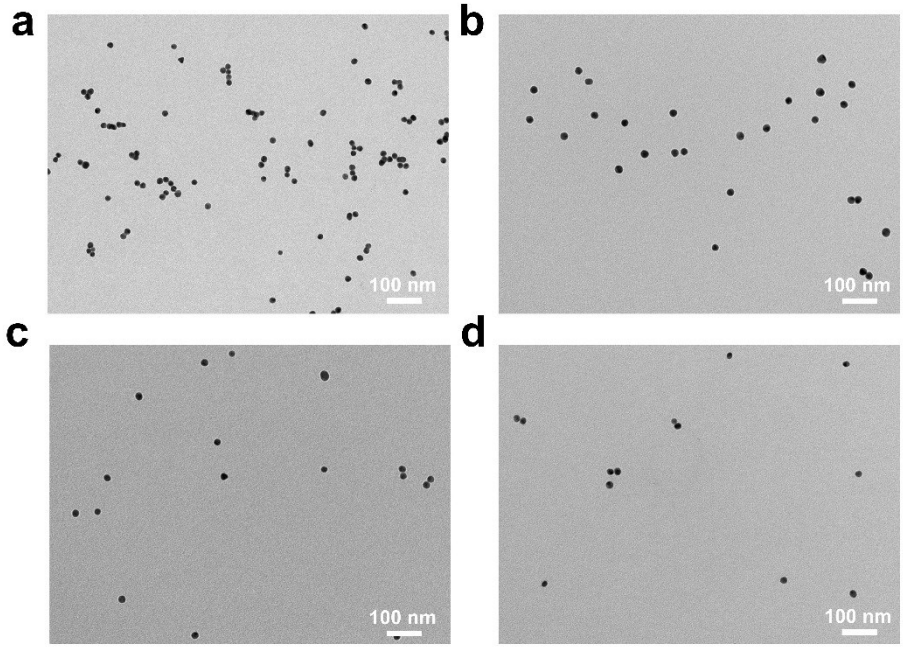

Figure S8. TEM images of AuNPs assembled with EA upon addition of different concentrations of $AgNO_3$ between 0.01 mM to 0.04 mM (a: 0.01 mM; b: 0.02 mM; c: 0.03 mM; d: 0.04 mM).

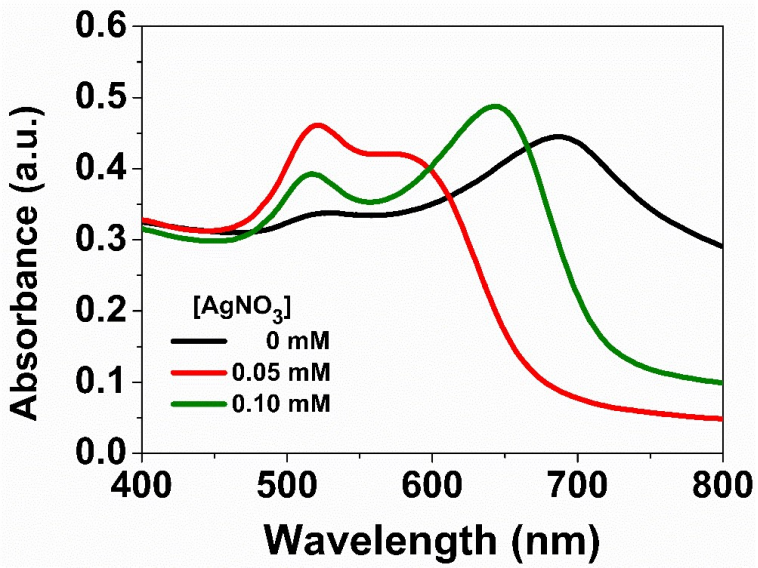

Figure S9. UV-vis spectra of AuNPs assembled with DEA upon addition of different concentrations of $AgNO_3$.

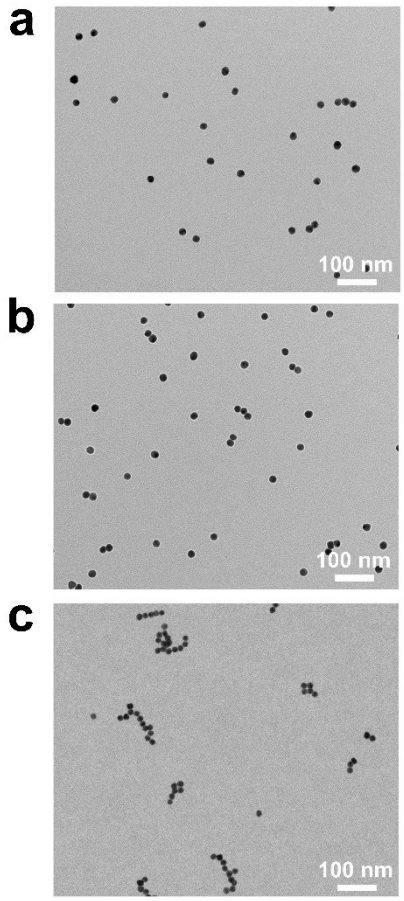

Figure S10. TEM images of AuNPs assembled with EA upon addition of different concentrations of $AgNO_3$ between 0.05 mM to 0.2 mM (a: 0.05 mM; b: 0.10 mM; c: 0.20 mM).

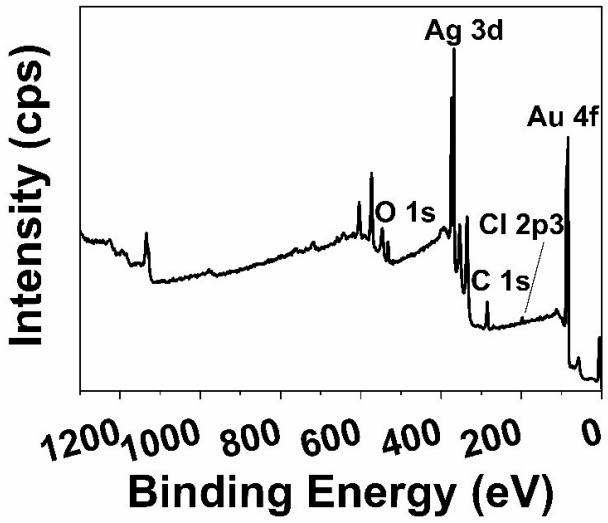

Figure S11. Full XPS survey spectrum of AuNCs assembled with EA and 0.4 mM $AgNO_3$.

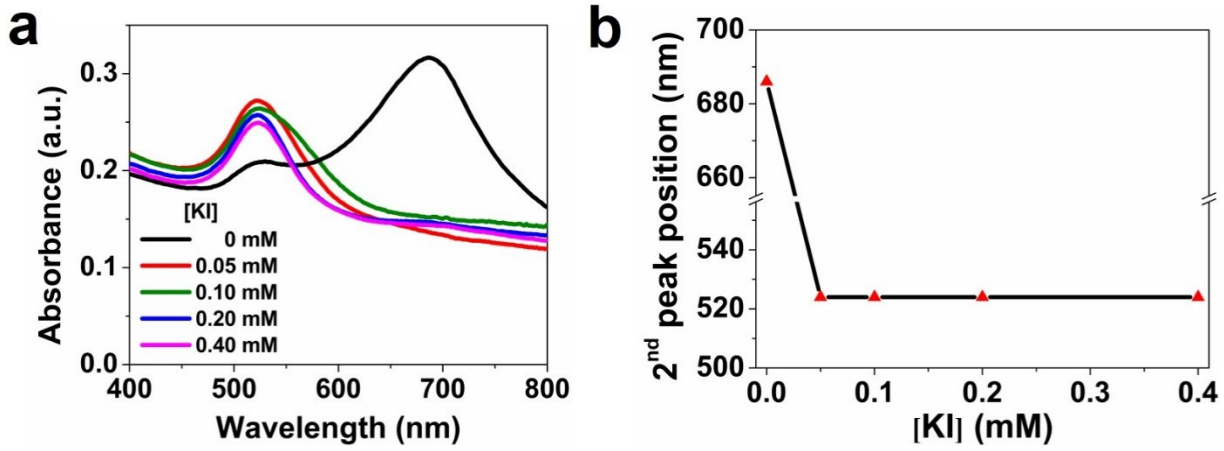

Figure S12. UV-vis spectra of AuNPs assembled with DEA upon addition of different concentrations of KI. (b) Plot of the second peak position of AuNPs assembly as a function of the concentration of KI.

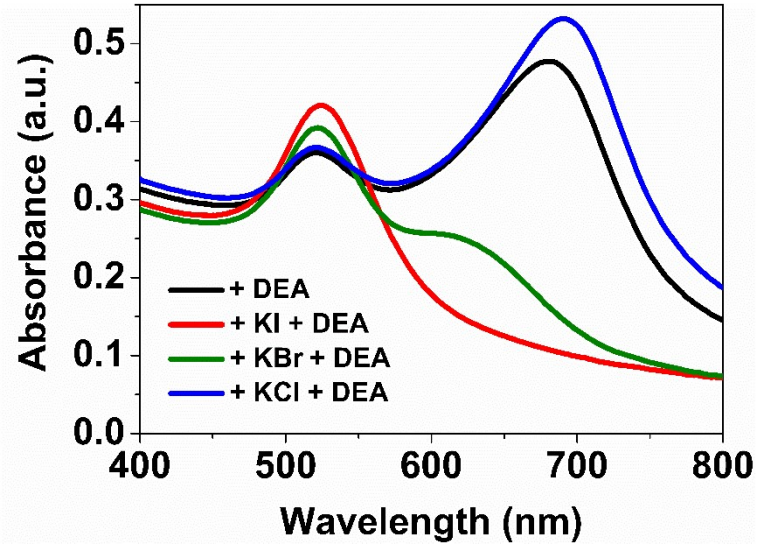

Figure S13. UV-vis spectra of AuNCs assembled with DEA upon addition of different types of halides.

Author contributions

C. Z. and Y. L. proposed this work. C. Z. and T.S. carried out the experiments. C. Z. performed the data analyses and wrote the manuscript. L. Z., Z. X. and Q. L. contributed significantly to analysis and manuscript preparation. M. D., X. K. and M. G. helped perform the analysis with constructive discussions. Y. L. revised the manuscript. All authors contributed to the discussion of the results.a