Electronic Supplementary Information

Enantiomeric Copper Based Anticancer Agents Promoting Site-Specific Cleavage of G-Quadruplex Telomeric DNA and non-random cleavage of plasmid DNA

Sabiha Parveen[a], J. A. Cowan[b], Zhen Yu[b] and Farukh Arjmand[a*]

[a]Department of Chemistry, Aligarh Muslim University, Aligarh 202002, Uttar Pradesh, India.

[b]Department of Chemistry and Biochemistry, The Ohio State University,100 West 18th Avenue, Columbus, OH 43210 (USA).

*Correspondence to: Dr. Farukh Arjmand, Department of Chemistry, Aligarh Muslim University, Aligarh 202002, Uttar Pradesh, India. tel: 0571 2703893, e-mail: farukh.arjmand18@gmail.com

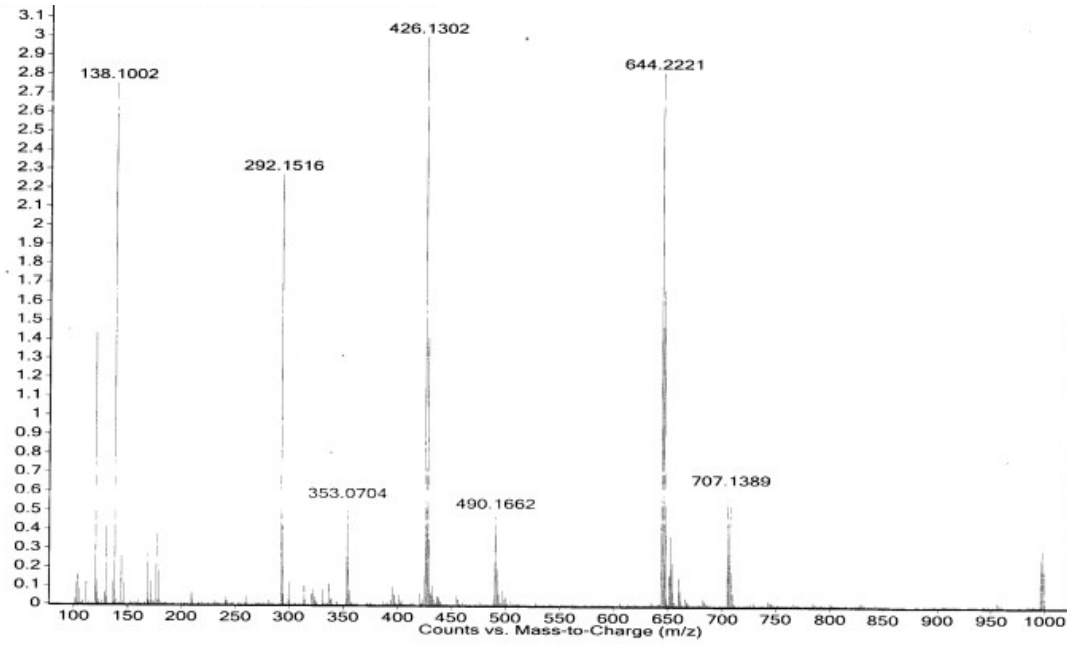

Fig. S1(i)*ESI-Mass spectrum of complex* $\mathbf{1}_S$.

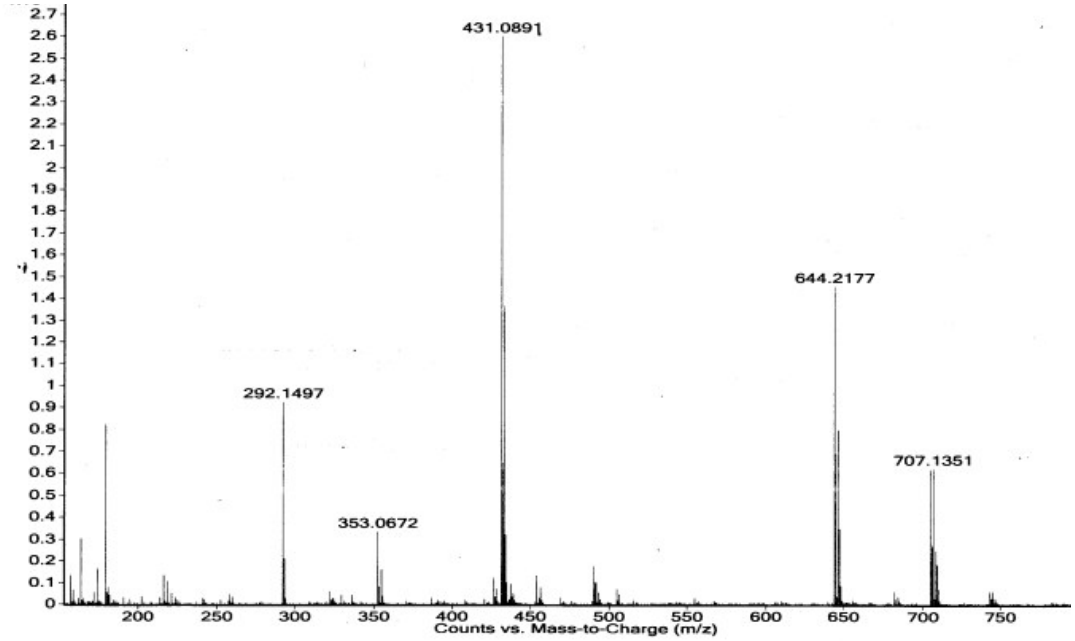

Fig. S1 (ii)*ESI-Mass spectrum of complex* $\mathbf{1}_{R.}$

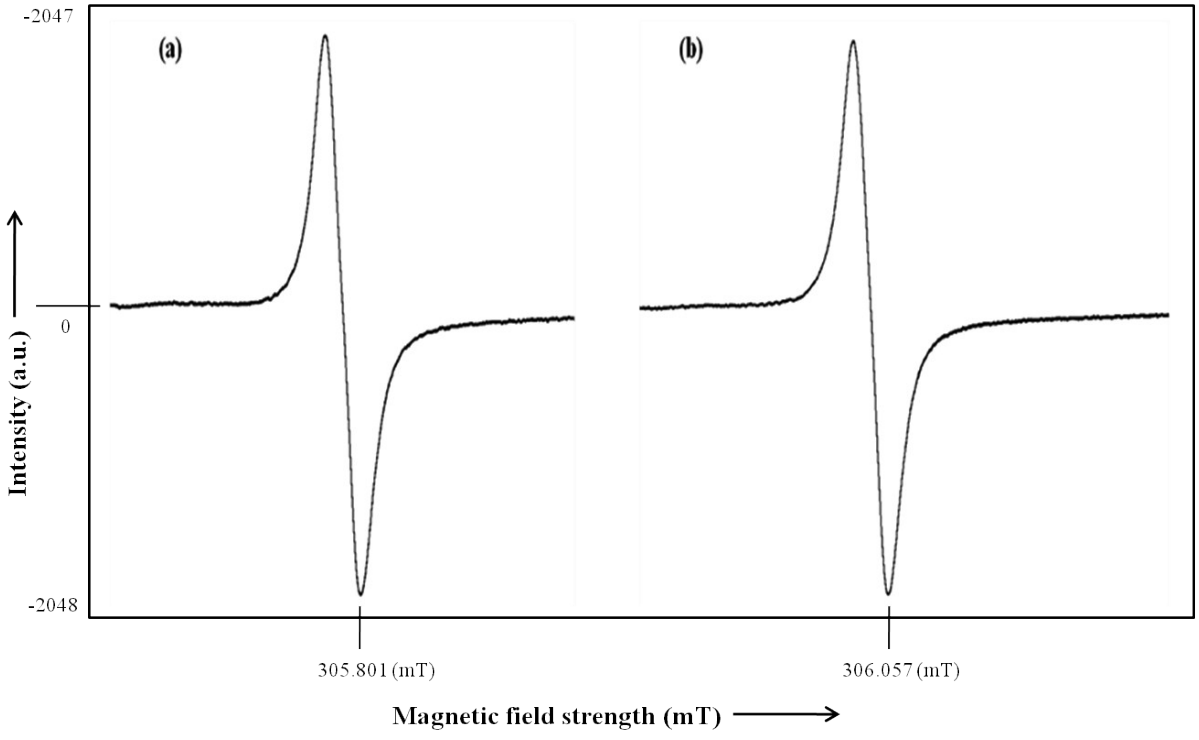

Fig. S2 *EPR spectra of complexes (a)* $\mathbf{1}_{S}$ *and (b)* $\mathbf{1}_{R.}$

Binding studies with CT-DNA

DNA interaction studies of complexes $\mathbf{1_S}$ and $\mathbf{1_R}$ were carried out by electronic absorption at λ_{max} *ca*. 274 and 270 nm, respectively following titration with aliquots of CT–DNA (0.00–3.33 $\times 10^{-5}$ M). The results demonstrated 'hyperchromicity' with no significant shift in absorption intensities (Fig. S3) and indicative of an electrostatic mode of binding.[1]

The intrinsic binding constant (K_b) values were quantified and found to be 5.031(±0.126)x 10^4, 3.862(±.235)x10^4 M^{-1} for $\mathbf{1_S}$ and $\mathbf{1_R}$, respectively. The binding propensity of S-enantiomer to CT–DNA was higher in magnitude than the corresponding R-enantiomer, underscoring the sensitive discrimination between two conformations. Most likely the higher affinity of S-enantiomer for DNA helix reflects a better fit to right-handed B–DNA due to compatible molecular symmetry based on the two–pole complementary principle.[2]

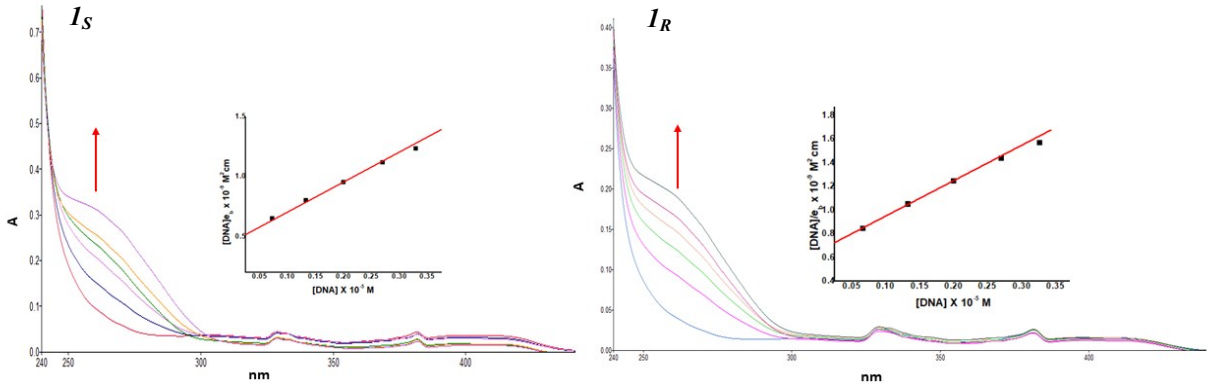

Fig. S3 *Absorption spectral traces of complexes* $\mathbf{1_S}$ *and* $\mathbf{1_R}$ *in Tris–HCl buffer upon addition of CT–DNA at 25 °C. Inset: plots of [DNA]/*ε_b *vs.[DNA] for the titration of CT–DNA with complexes,[Complex] 0.67 x*10^{-5} *M, [DNA] 0–3.33 x* 10^{-5} *M.*

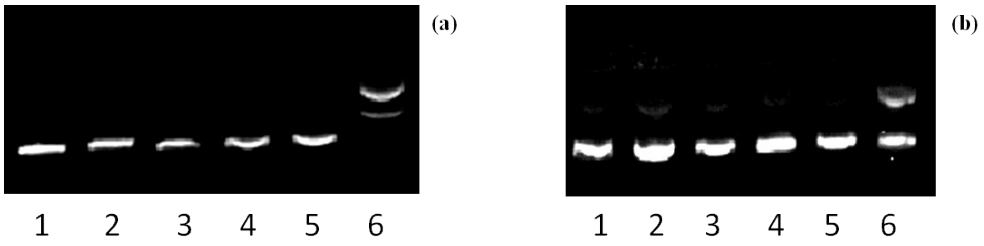

Fig. S4 *Control reactions for DNA cleavage (a)* ***1S*** *and (b)* **1R**, *carried out in 10 mM Tris buffer, pH =7.4, 37 ºC, for 30 min, with [DNA] = 50 μM for each reaction. Lane (1) DNA starting material; (2) DNA spontaneous reaction; (3) DNA + Asc 1mM; (4) DNA + Asc + H_2O_2 1mM; (5) DNA + 10nM* ***1S/1R****. (6) DNA+ 1 mM Asc+ 1 mM H_2O_2 + 10nM* ***1S/1R****.*

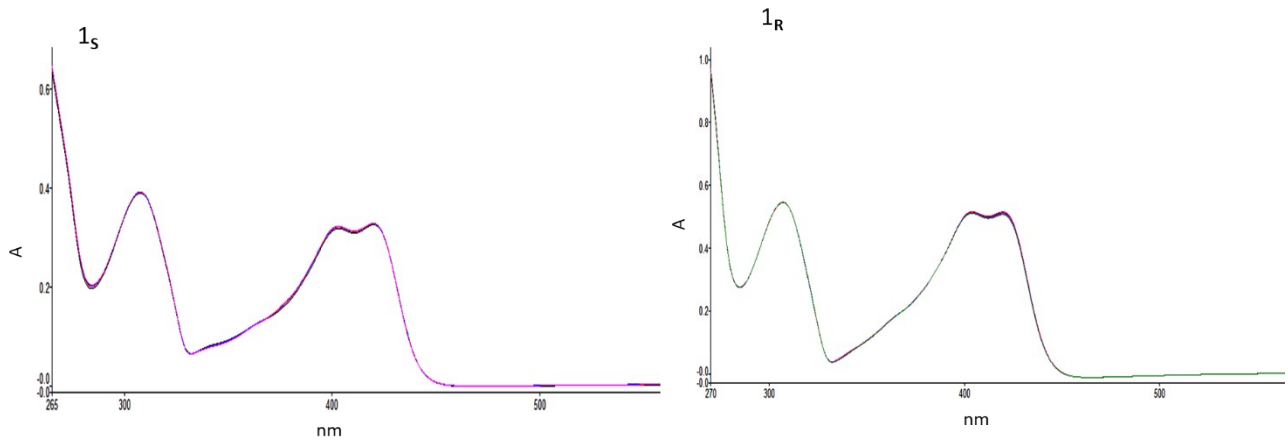

Fig. S5 *UV–vis absorption spectra of complexes* ***1S*** *and* ***1R*** *at different time intervals (0 h, 1 h, 12 h, and 24 h).*

References

1 S. Parveen, M. Usman, S. Tabassum and F. Arjmand, Synthesis of chiral R/S-pseudopeptide-based Cu(II) & Zn(II) complexes for use in targeted delivery for antitumor therapy: enantiomeric discrimination with CT-DNA and pBR322 DNA hydrolytic cleavage mechanism, *RSC Adv.*, 2015, **5**, 72121–72131.

2 P. Yang and M. Guo, Interaction of Some Non-Platinum Metal Anticancer Complexes With Nucleotides and DNA and The Two-Pole Complementary Principle (TPCP) Arising Therefrom, *Met.-Based Drugs*, 1998, **5**, 41–58.