Electronic Supplementary Material (ESI) for Dalton Transactions.

Supplementary Data

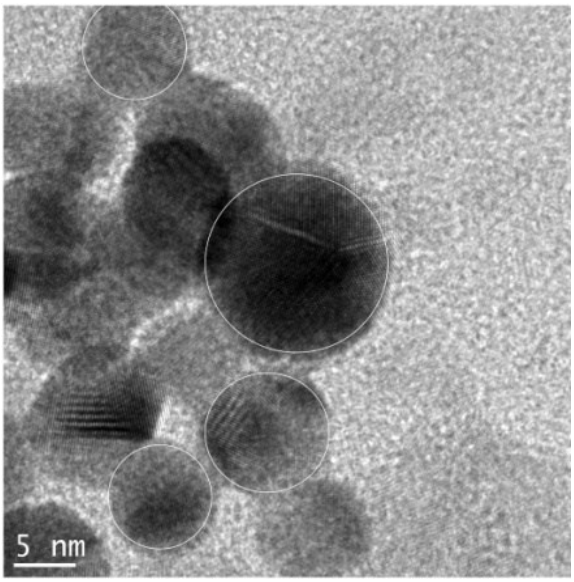

Fig. S1 HRTEM image of capped SeNPs.

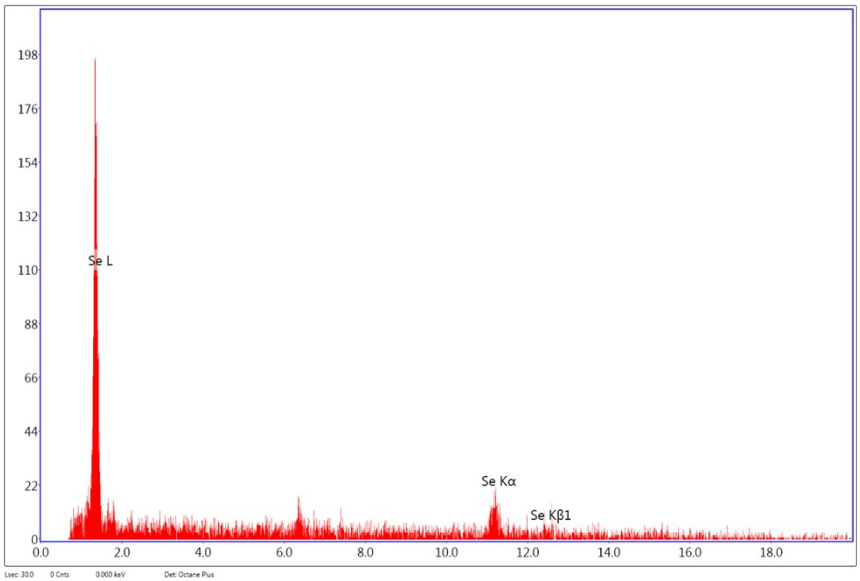

Fig. S2 EDAX spectrum of SeNPs.

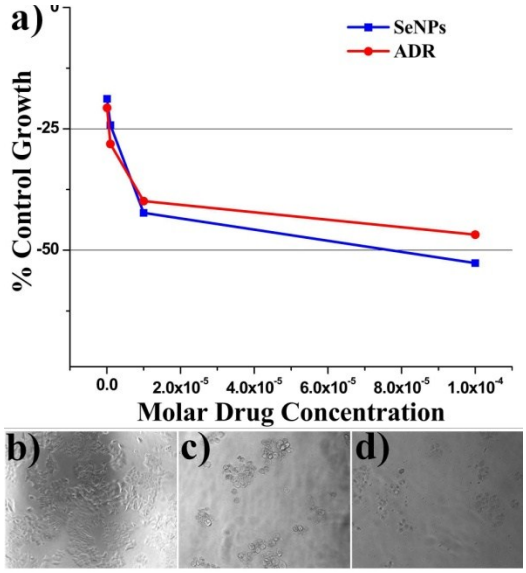

Fig. S3 (a) % Control Growth curve of Human Breast Cancer Cell Line MCF-7 with SeNPs and Adriamycin (ADR) Positive control compound in molar concentrations. Phase-contrast microscopic images obtained for morphological study of **(b)** breast cancer cells MCF-7 (control), **(c)** MCF-7+ ADR **(d)** MCF-7+ SeNPs.

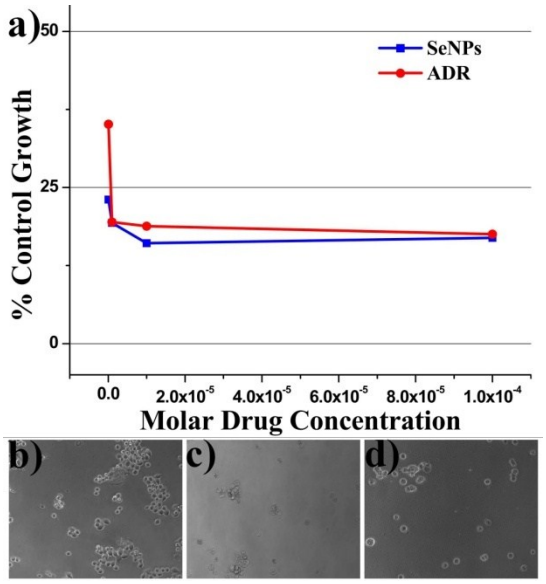

Fig. S4 (a) % Control Growth curve of Human Colon Cancer Cell Line COLO-205 with SeNPs and Adriamycin (ADR) Positive control compound in molar concentrations. Phase-contrast microscopic images obtained for morphological study of **(b)** breast cancer cells COLO-205 (control), **(c)** COLO-205 + ADR **(d)** COLO-205 + SeNPs.

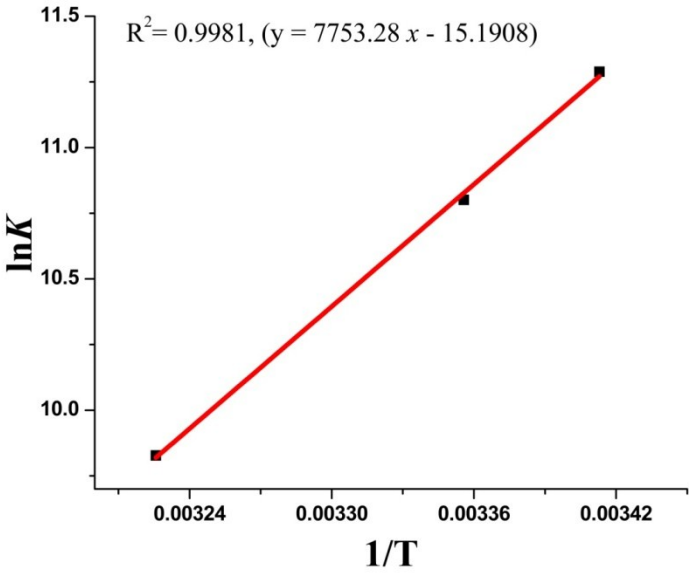

Fig. S5 Plot of ln$K$ vs. 1/T of the interaction between hsDNA and SeNPs at different temperatures.

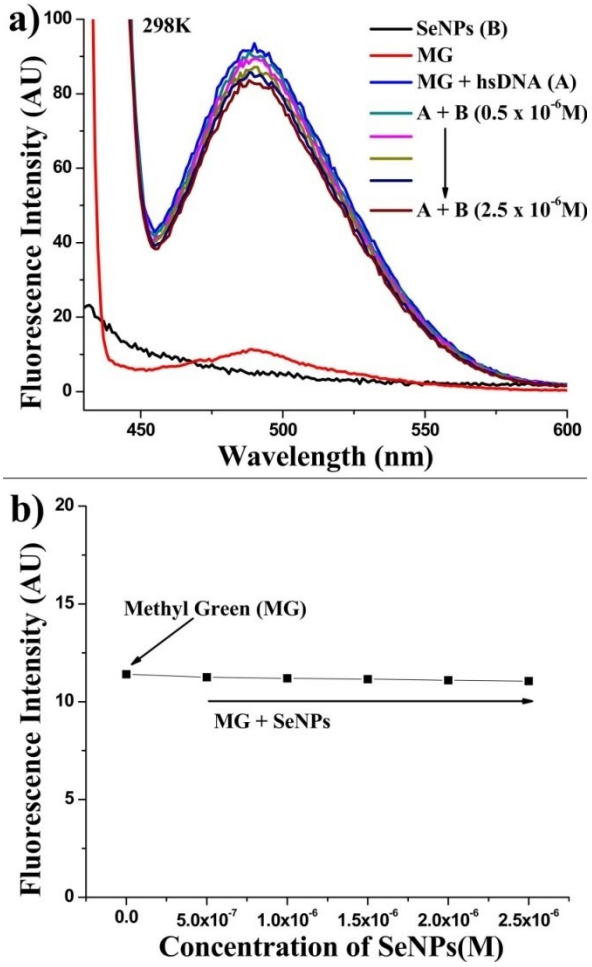

Fig. S6(a) Fluorescence spectra of the MG-hsDNA (A) complex with SeNPs (B). The concentrations of hsDNA and MG were $50x10^{-6}$M, $20x10^{-5}$M, respectively. The MG-hsDNA complex was excited at 422 nm and emission spectra were recorded from 430-600nm. **(b)** Fluorescence spectra of MG (concentration $20x10^{-5}$M) with varying concentrations of SeNPs.

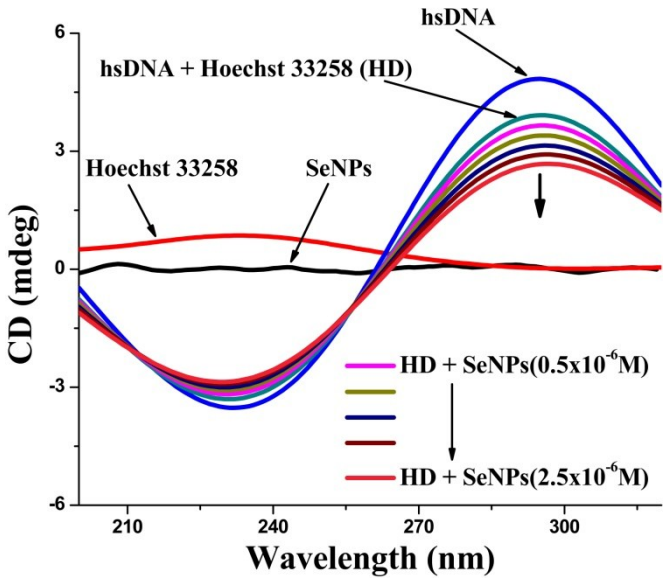

Fig. S7 Comparative study of CD spectra showing all sorts of characteristics DNA-Hoechst 33258 (HD) interaction, addition of SeNPs decreases the positive band CD signal to a certain extent, inferring the replacement of Hoechst 33258 molecules from the minor groove of hsDNA.[S1]

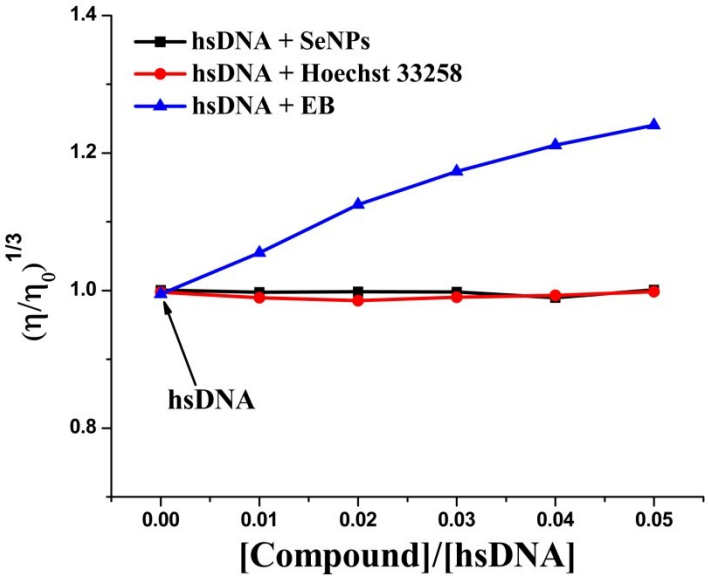

Fig. S8 Effect of increasing amounts of SeNPs, Hoechst 33258 and EB on the viscosity of hsDNA ($50x10^{-6}$M) respectively in Tris HCl buffer at 298 K [Compound]/[DNA]. Constant concentration of hsDNA ($50 x10^{-6}$M) in a sample holder was monitored, the viscosity of hsDNA in absence and presence of various concentrations of SeNPs, Hoechst 33258 and EB respectively ($0.5\text{-}2.5x10^{-6}$M). The results of the viscosity experiments confirmed that SeNPs do not cause significant increase to the hsDNA solution viscosity compared to the well established intercalator EB which acted as a control for this experiment. Hoechst 33258 reagent is used as a positive control to represent a minor groove binder. The viscosity readings for the Hoechst 33258 compound were similar to that of SeNPs.[S2- S3]

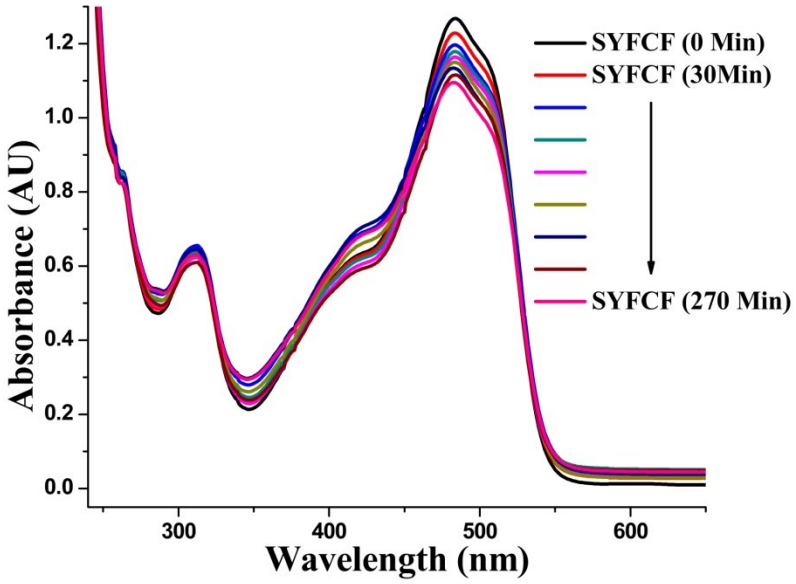

Fig. S9. The changes in UV–Vis spectra of SYFCF dye ($2.2x10^{-4}$M) on irradiation with Ultraviolet-B light in the absence of SeNPs at 30 min time intervals.

Table S1 Theoretical particle size of SeNPs

Sample	Peak position (2θ)			Mean value
	29.58°	23.36°	43.53°	
SeNPs size	20.24 nm	17.64 nm	22.92 nm	20.26 nm

Table S2 Breast Cancer activity of SeNPs against MDA MB 435 Cell Line

Human Breast Cancer Cell Line MDA MB 435								
% Control Growth								
Molar Drug Concentrations								
	Experiment 1				Experiment 2			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	65.1	8.6	-6.5	-36.6	-4.0	-7.9	-33.6	-48.2
ADR	84.5	38.8	-50.7	-54.9	19.9	-17.8	-58.0	-65.3
	Experiment 3				Average Values			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	-5.3	-15.4	-22.1	-51.0	18.6	-4.9	-20.8	-45.2
ADR	15.0	-13.4	-40.3	-58.0	39.8	2.6	-49.7	-59.4

Table S3 Breast Cancer activity of SeNPs against MCF-7 Cell Line

Human Breast Cancer Cell Line MCF-7								
% Control Growth								
Molar Drug Concentrations								
	Experiment 1				Experiment 2			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	-19.5	-28.3	-57.8	-53.7	-19.9	-30.4	-64.5	-58.5
ADR	-20.6	-27.9	-41.5	-44.9	-26.3	-35.5	-43.9	-42.9
	Experiment 3				Average Values			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	-17.0	-14.0	-35.6	-14.6	-18.8	-24.2	-52.6	-42.3
ADR	-15.1	-20.9	-34.3	-52.5	-20.7	-28.1	-39.9	-46.8

Table S4 Colon Cancer activity of SeNPs against COLO-205 Cell Line

Human Breast Cancer Cell Line COLO-205								
% Control Growth								
Molar Drug Concentrations								
	Experiment 1				Experiment 2			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	25.3	18.8	15.2	16.0	26.0	25.7	14.0	18.0
ADR	29.9	13.2	15.9	25.3	29.8	17.6	21.5	8.0
	Experiment 3				Average Values			
Conc.	10^{-7}	10^{-6}	10^{-5}	10^{-4}	10^{-7}	10^{-6}	10^{-5}	10^{-4}
SeNPs	17.9	13.5	19.1	16.8	23.1	19.3	16.1	16.9
ADR	45.6	27.6	19.0	19.2	35.1	19.5	18.8	17.5

Table S5 Comparative SeNPs and ADR concentrations (μMolar) calculated from graph of breast Cancer activity (MDA-MB-468 cell line)

Drug concentrations (μMolar) calculated from graph			
MDA-MB-468	**LC50**	**TGI**	**GI50***
SeNPs	>100	0.8	<0.1
ADR	79.8	3.2	<0.1

LC50 = Concentration of drug causing 50% cell kill, GI50 = Concentration of drug causing 50% inhibition of cell growth, TGI = Concentration of drug causing total inhibition of cell growth, ADR = Adriamycin, Positive control compound, GI50 value of $\leq 10^{-6}$ molar (i.e. 1 μmolar) considered to demonstrate activity.

Table S6 Comparative SeNPs and ADR concentrations (μMolar) calculated from graph of breast Cancer activity (MCF-7 cell line)

Drug concentrations (μMolar) calculated from graph			
MCF-7	**LC50**	**TGI**	**GI50***
SeNPs	NE	<0.9	<0.9
ADR	NE	<0.18	<0.18

Table S7 Comparative SeNPs and ADR concentrations (μMolar) calculated from graph of colon Cancer activity (COLO-205 cell line)

Drug concentrations (μMolar) calculated from graph			
COLO-205	**LC50**	**TGI**	**GI50***
SeNPs	NE	<0.9	<0.9
ADR	NE	NE	<0.18

Table S8 Binding parameters of SeNPs with hsDNA at different temperatures

Temperature (K)	***Ksv*** **(M^{-1})**	***Kq*** **($M^{-1}s^{-1}$)**	***K*** **(LM^{-1})**	***n***
293	5.19×10^{4}	5.19×10^{12}	7.99×10^{4}	1.0394
298	3.76×10^{4}	3.76×10^{12}	4.90×10^{3}	1.0202
310	2.03×10^{4}	2.03×10^{12}	1.85×10^{3}	1.0072

Table S9 Thermodynamic parameters of SeNPs-hsDNA interaction

Temperature (K)	$\Delta H°$ (KJmol^{-1})	$\Delta S°$ (Jmol^{-1}K^{-1})	$\Delta G°$ (KJmol^{-1})
293	-64.46	-126.29	-27.45
298			-26.82
310			-25.31

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S1. S. Satpathi, A. Sengupta, V. M. Hridya, K. Gavvala, R. K. Koninti, B. Roy, P. Hazra. *Sci. Rep.,* **5** (9137), DOI: 10.1038/srep09137.

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S3. P. K. Sasmal, R. Majumdar, R. R. Dighe*,* A. R. Chakravarty. *Dalton Trans.,* 2010, **39**, 7104-7113.