Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Data

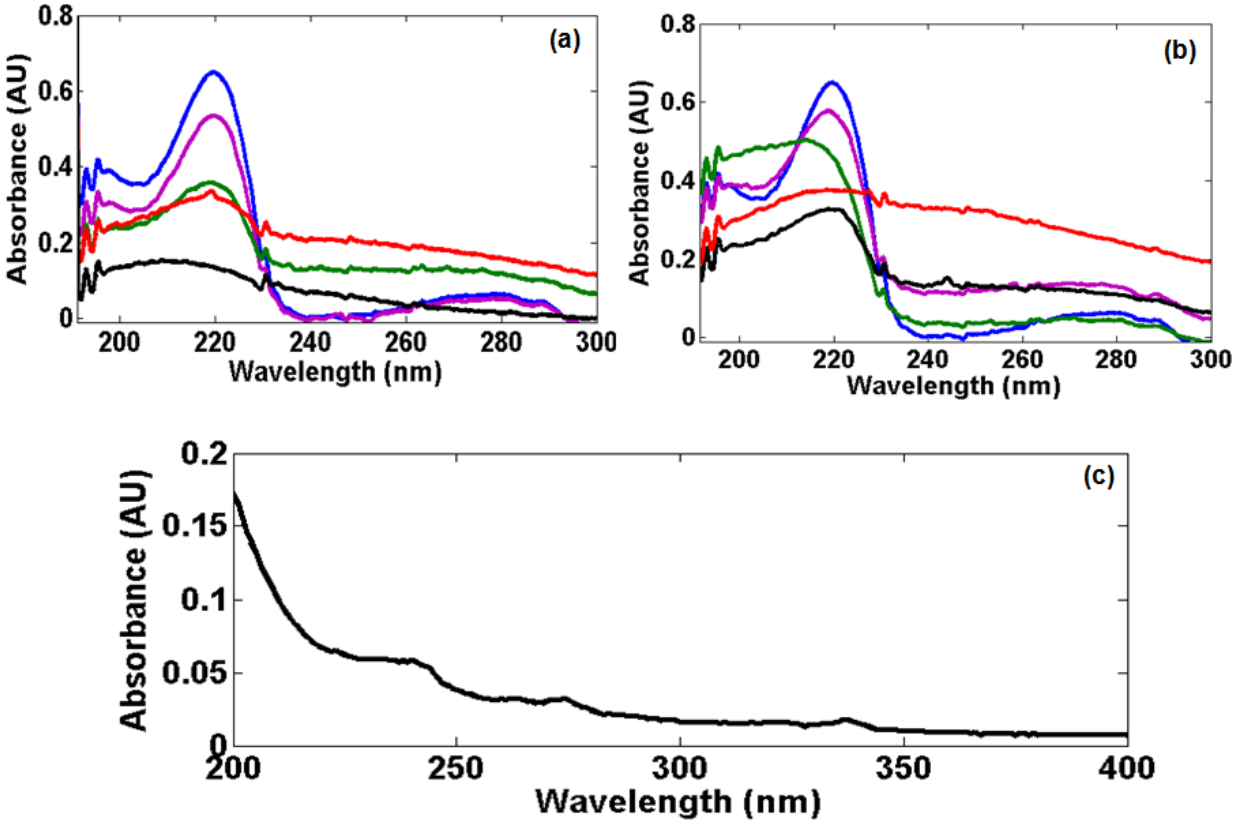

Fig S1 UV-VIS spectra of (a) D-Trp (blue) and D-Trp functionalized SWNTs with nanotube concentrations 0.2 mg/ml (violet), 0.4 mg/ml (green), 0.6 mg/ml (red) and 1 mg/ml (black); (b) L-Trp (blue) and L-Trp functionalized SWNTs with nanotube concentrations 0.2 mg/ml (violet), 0.4 mg/ml (green), 0.6 mg/ml (black) and 1 mg/ml (red) and (c) pristine SWNTs

The UV-Vis absorption studies (see Fig S1) clearly reveals that the nature of the spectra changes for D-Trp functionalized SWNTs and L-Trp functionalized SWNTs. The nature of the spectra is different for D-Trp and L-Trp functionalized SWNTs. It is possible only when the interacting molecule (here D and L tryptophan) differentially bind with the substrate (SWNTs in our case). It also validates the relative change in PL intensity values and confirms lack of scattering.

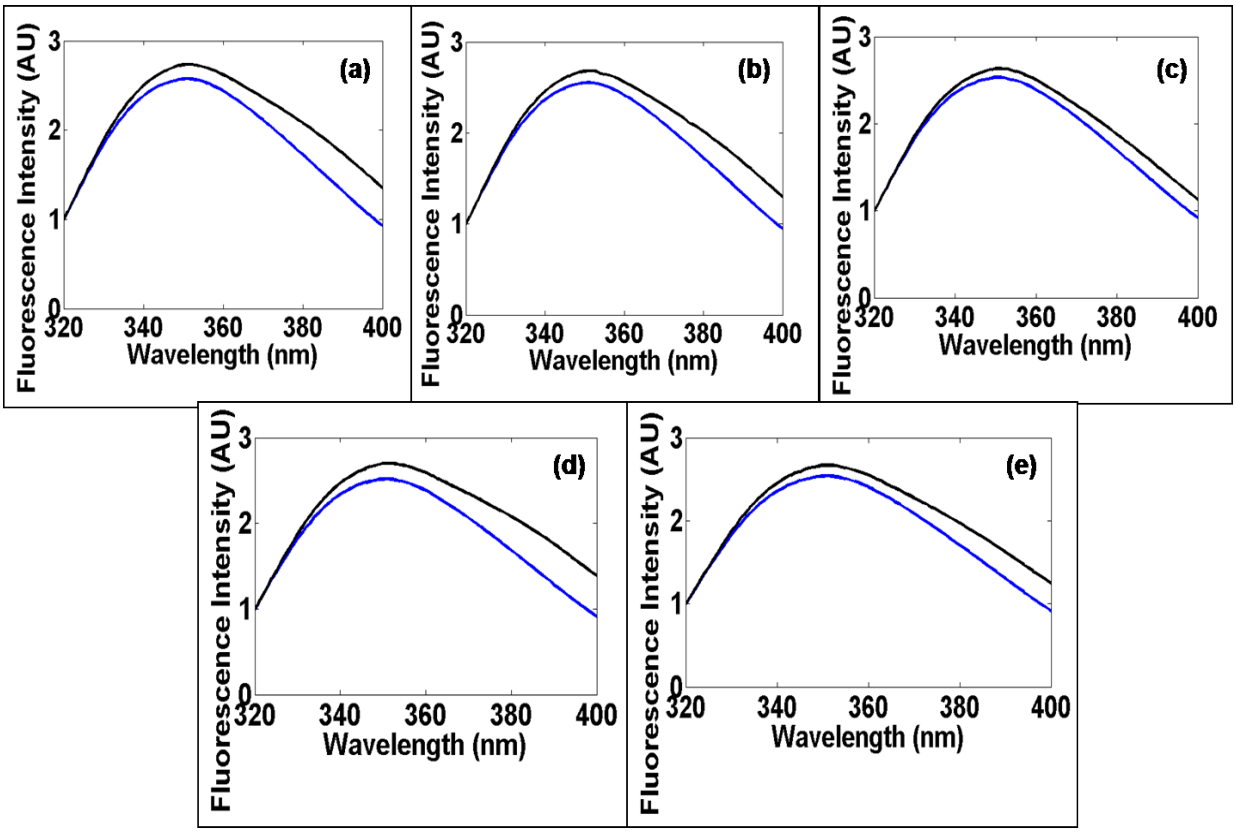

Fig S2 Fluorescence spectra of functionalized SWNTs with racemic mixtures of L- and D-Trp with ratios (a) 80:20 (b) 60:40 (c) 50:50 (d) 40:60 (e) 20:80 respectively. Black color represents the spectra of racemic mixtures of L- and D-Trp only and blue color represents the spectra of racemic mixtures of L and D trp functionalized SWNTs

Fig S2 represents differential fluorescence response of L- and D-Trp functionalized SWNTs. The fluorescence intensity of L- and D-Trp is reduced upon quenching due to functionalization. As SWNTs

bind with L-Trp better than D-Trp, higher quenching is observed with increase in concentration of L-Trp in the racemic mixture. This differential response raises an important clue on enantio-specificity of SWNTs in a racemic mixture of amino acids.

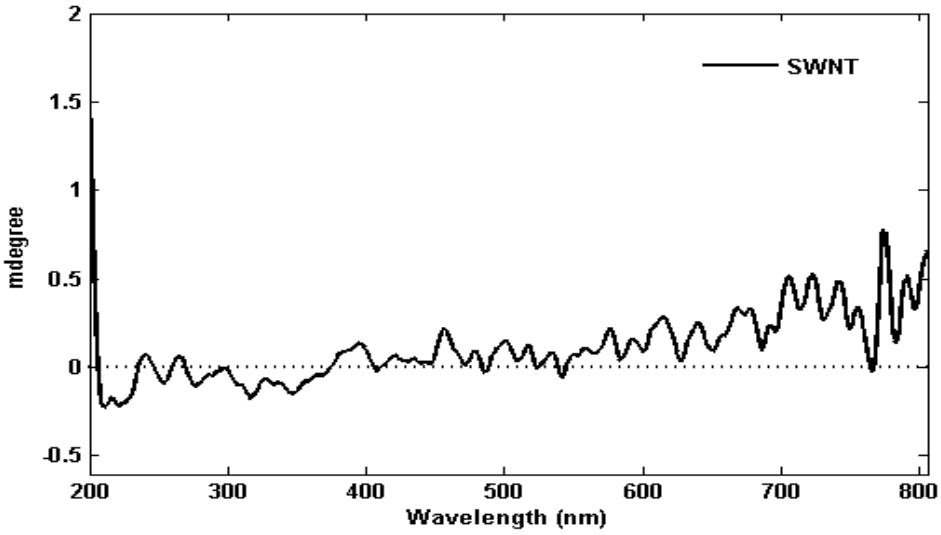

Fig S3 CD signal of pristine zigzag single wall carbon nanotubes

Fig S3 represents the CD spectrum of pristine SWNTs. As no chiral signal is observed therefore it can be confirmed that our synthesized SWNTs are zigzag in nature because our previous study confirm the semiconducting nature of our synthesized pristine SWNTs [1-4]. As SWNTs are semiconducting in nature, therefore SWNTs either may be chiral or zigzag because armchair SWNTs is metallic in nature. The absence of CD signal of our synthesized SWNTs (validated by a null CD signal as shown in Fig S3) confirms that the major population is zigzag in nature.

Whether this unique chiral selection of pristine zigzag SWNTs can be generalized for structural identification or discrimination of any geometrical chiral molecules, we performed the CD experiment

with penicillamine, a different chiral molecule (see Fig S4). The differential CD pattern of D and L-penicillamine with various concentrations of SWNTs is observed. The change in ellipticity (mdegree) is more in case L-penicillamine than compared to D-penicillamine as well. The differential binding affinity of L and D penicillamine with pristine zigzag SWNT confirms the chiral selection of pristine SWNTs.

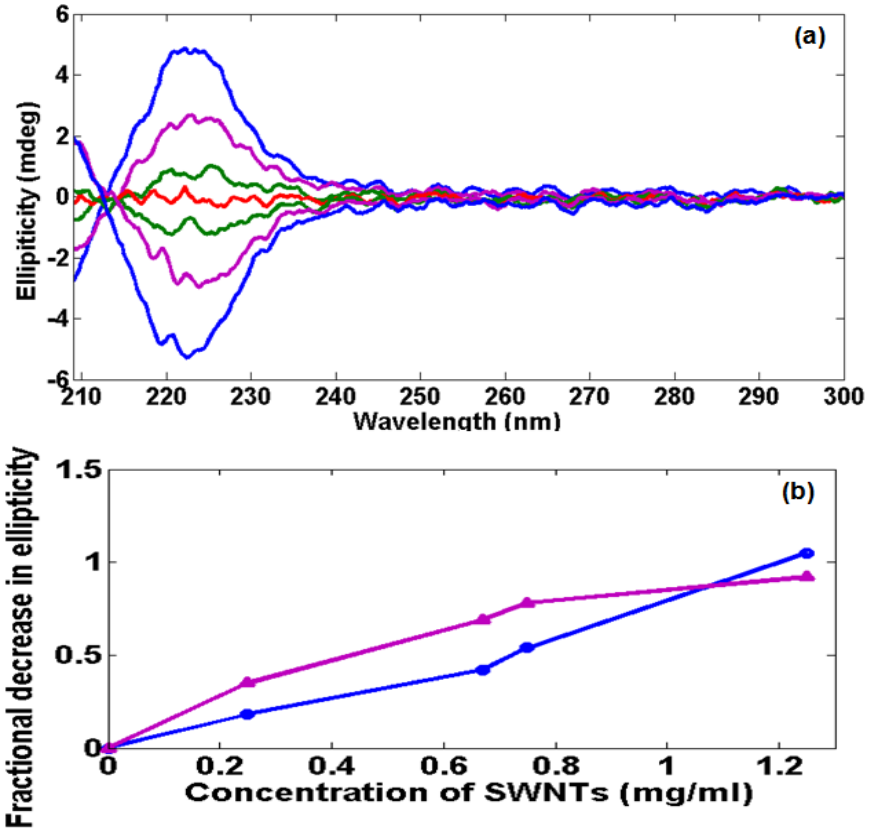

Fig S4 (a) CD spectra of L and D penicillamine functionalized with varying concentration of SWNTs; blue color represents L and D penicillamine, violet color represents L and D penicillamine functionalized SWNTS (L: D=80:20), green color represents L and D penicillamine functionalized SWNTS (L: D=60:40) and red color represents L and D penicillamine functionalized SWNTS (L: D=50:50) (b) Binding nature of pristine SWNTs with L and D penicillamine

Fig S5 describes how single wall carbon nanotubes can be used as a chiral column. Monochromator is used for passing a particular monochromatic light from the emitted light. The polarizer is used for passing a particular ray (polarized ray) whose optical vibration is parallel to the optic axis of the polarizer (basically a quarter wave plate can be made by tourmaline crystal or quartz crystal or nicol prism). As the polarizer is a quarter wave plates (quartz crystal or tourmaline crystal or nicol prism) the emitted light is either left circularly (L) or right circularly (R) polarized light depending upon the optical rotation of the emitted light. Carbon nanotubes have been used as a column material and different geometrical chiral materials can be used as analytes which pass through the column material. Finally the signal is collected by a detector. The entire closed system should be integrated with a PC under inert (N_2 or other inert gases) atmosphere.

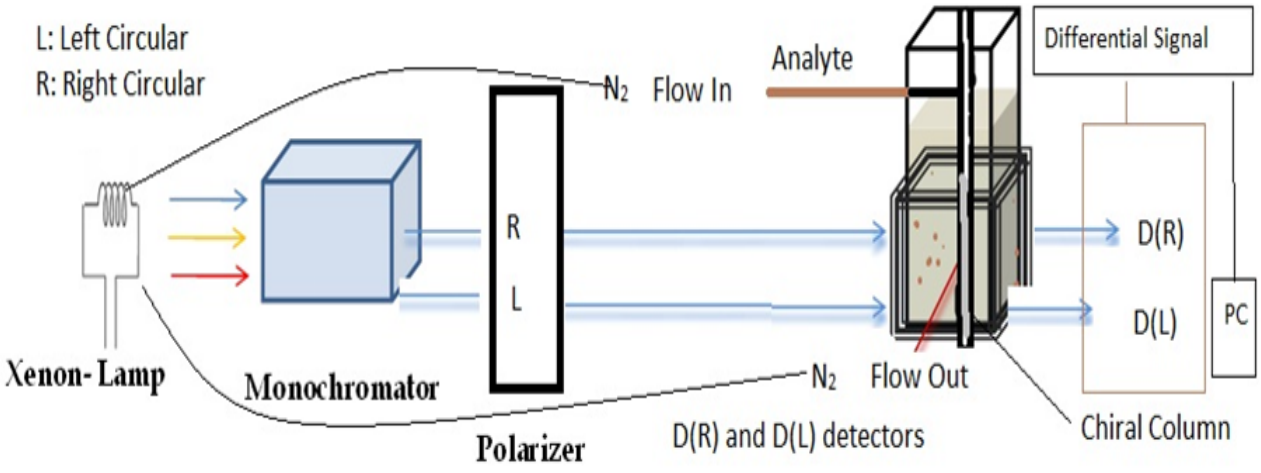

Fig S5 Design of a single wall carbon nanotubes based chiral column

References

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2. T. Bhattacharyya, S. Samaddar and A. K. Dasgupta, Nanoscale, 2013, **5**, 9231-9237.
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4. T. Bhattacharyya and A. K. Dasgupta, J. Electroanal. Chem., 2013, **706**, 133-139.