

Handedness Enantioselection of Carbon Nanotubes Using Helical Assemblies of Flavin Mononucleotide

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The supramolecular organizations of flavin mononucleotide around single walled carbon nanotubes (SWNTs) was shown to provide effective nanotube dispersions and the ability to impart selective (*n,m*) chirality enrichment by recognizing the underlying nanotube helical pattern. In this contribution we show that the chiral *D*-ribityl phosphate chain of FMN induces a right-handed helix that enriches the left-handed SWNTs for all suspended (*n,m*) species. Such enantioselectivity stems from the sp^3 hybridization of the nitrogen atom anchoring the sugar moiety to the flavin ring. This produces two FMN conformations (*syn*- and *anti*-) analogous to DNA. Electrostatic interactions between the neighboring uracil moiety and the 2'-OH group of the side chain provide greater stability to the anti-FMN conformation that leads to a right-handed FMN helix. The right-handed twist that the FMN helix imposes to the underlying nanotube, similar to an "Indian burn", causing diameter dilation of only the left-handed SWNTs, whose improved intermolecular interactions with the overlaying FMN helix, impart enantioselection.

Financial Support from AFOSR and NSF is kindly acknowledged.