

Chiral brush polymers for enantiomeric analysis

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Our research is focused on the development of new methods and materials for the study of chiral recognition. Undergraduates working on this project will develop chiral brush polymers for the determination of enantiomeric composition. The pervasiveness of chiral drug-development demands fast and sensitive methods for the determination of enantiomeric composition. Recent work in our laboratory has focused on developing fluorescence anisotropy as a technique to evaluate chiral interactions^{xii} and we have demonstrated the rapid and accurate determination of enantiomeric composition (e.e.).^{xiii} Figure 4 shows the fluorescence anisotropy as a function of e.e. for binaphthyl-2,2'-diylhydrogenphosphate (BNP) in the presence of BNP solutions of varying e.e.; Table 1 confirms the accuracy of the technique using a two-point calibration.

REU participants will learn to immobilize and characterize chiral selectors on a surface, such as a capillary wall. An example is shown in Figure 3, which depicts a silica capillary as a flow cell with on column measurement of the fluorescence anisotropy. We expect this approach to be even more sensitive than those performed in bulk solution (Table 1).

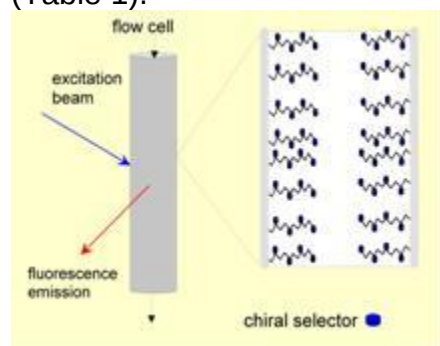


Figure 3. Depiction of apparatus for the rapid determination of e.e.

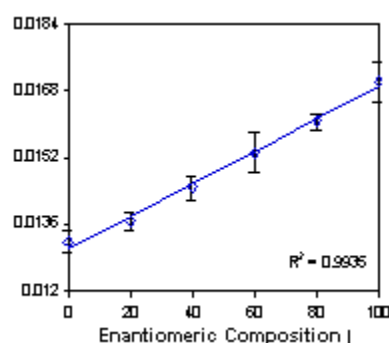


Figure 4. Anisotropy of BNP (31mM) as a function of enantiomeric composition.^{xiii}

Actual%	Measured%
95	92 ± 3
64	63 ± 1
36	34 ± 2
5	6 ± 1

Table 1. Determination of e.e. for BNP (%S).^{xiii}

Various strategies will be explored to immobilize chiral selectors, such as traditional silane chemistry and in situ growth of polymer brushes using monomers with chiral functionality. We have recently synthesized a prototype acryl-amino acid monomer and the corresponding brush polymer. We anticipate growing chiral brush polymers with thicknesses up to 1 micrometer. The project is interdisciplinary and undergraduates will gain experience in various aspects of synthetic and analytical chemistry. Students will become proficient in the use of fluorescence spectroscopy, capillary electrophoresis, and various characterization methods. These experiences will serve them well as they pursue graduate studies, regardless of their eventual specialization.