Panoramic Overview on the Enantioselection Performance of Inherently Chiral Surfaces: a Comparison between Systems with Different Atropisomeric Cores and Stereogenic Elements

Serena Arnaboldi[1], Tiziana Benincori[2], Simona Rizzo[3], Francesco Sannicolò[1], Patrizia R. Mussini[1]
[1]*Università degli Studi di Milano, Dipartimento di Chimica, Via Golgi 19, 20133 Milano, Italy.*
[2]*Università degli Studi dell'Insubria, Dipartimento di Scienza e Alta Tecnologia, Via Valleggio 11, 22100 Como, Italy*
[3] *Istituto di Scienze e tecnologie Molecolari, CNR, via Golgi 19, 20133 Milano, Italy.*
serena.arnaboldi@unimi.it

Enantiorecognition is a key issue in advanced analytical chemistry, particularly concerning the biological and pharmaceutical field. Enantiomeric molecules, being mirror-image structures, have identical physico-chemical scalar properties, but opposite pseudo-scalar ones. When interacting with a racemic probe, chiral molecules are able to recognize the enantiomers through diasteromeric interactions.
Similarly, chiral electrodes are required for enantioselective electroanalysis, and the development of "intelligent" electrodes capable of discriminating enantiomers, in particular molecules of biological and pharmaceutical importance, remains as one of the major challenges in electroanalysis.
We have recently proposed the first synthetic inherently chiral electrode surfaces able to neatly discriminate as separate peaks (in terms of potential values) the antipodes of model chiral probes, also drugs, both as enantiopure and racemate. [1-2] We have also verified the general validity of the inherently chiral concept, which does not depend from the chemical nature of the atropisomeric scaffold, testing chiral surfaces electrooligomerized from starting monomers with different molecular design (*i.e.* bithiophene, bibenzothiophene, biindole and paracyclophane cores) and different stereogenic elements (stereogenic axis *vs* helix *vs* plane). In order to fully elucidate the enantioselection capability of all of these heteroaromatic systems we propose a detailed comparison (an example in Figure) of our inherently chiral surfaces with different atropisomeric core *vs* thiahelicene-based films *vs* "two floor" paracyclophanic oligomers.

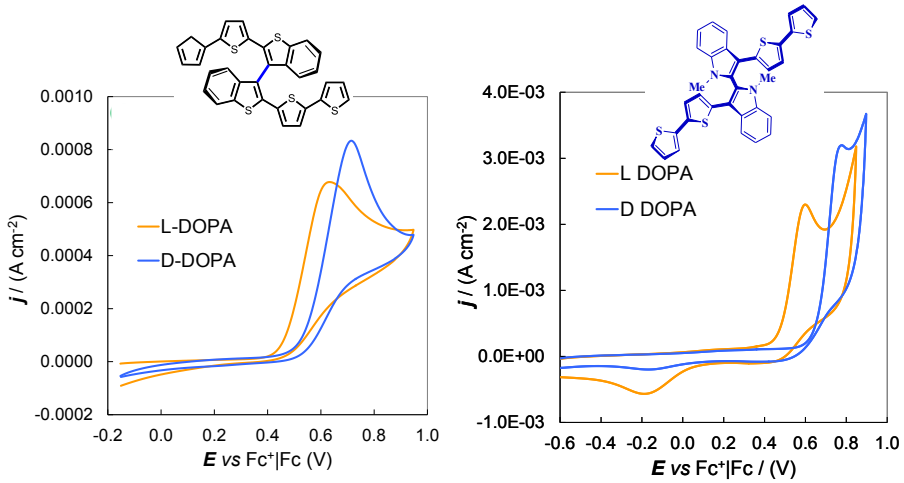

Figure. Enantioselection properties of inherently chiral oligomers with bibenzothiophene and biindole units towards L- and D-DOPA probes.

The support of Fondazione Cariplo/Regione Lombardia "Avviso congiunto per l'incremento dell'attrattività del sistema di ricerca lombardo e della competitività dei ricercatori candidati su strumenti ERC - edizione 2016" (Project 2016-0923) is gratefully acknowledged.

References:
[1] F. Sannicolò, S. Arnaboldi, T. Benincori, V. Bonometti,R. Cirilli, L. Dunsch, W. Kutner, G. Longhi, P. R. Mussini, M. Panigati, M. Pierini, S. Rizzo, *Angew Chem. Int. Ed.*, 53 (2014) 2623-2627.
[2] S. Arnaboldi, T. Benincori, R. Cirilli, W. Kutner, M. Magni, P. R. Mussini, K. Noworyta, F. Sannicolò, *Chem. Sci*., 6 (2015) 1706-1711