



PhD position n°2 - Enantioselective preferential physisorption, chemisorption, and dimerization at spin-polarized interfaces

Université Libre de Bruxelles - Free University of Brussels - (ULB) is a major academic institution with international recognition for scientific achievements, see <https://www.ulb.be/>

The group of **Prof. Yves Geerts** is active in the design, synthesis, processing and characterization of advanced molecular materials with unprecedented properties, see <http://chimpoly.ulb.be/>

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Objective of the PhD thesis: To demonstrate that spin-polarization can lead to specific enantiomeric excess.

Expected results: It has been demonstrated that enantiomers adsorb differently on spin-polarized metallic surfaces and that spin controls the fate of reduced or oxidized species on spin-polarized electrodes. However, few examples are known and no molecular design rules exist. Moreover, the evidences of enantiomeric excess are rather indirect. DC2 will design and synthesize various molecular systems tailored to either adsorb or react on spin-polarized interface. Enantiomeric excess will be assessed locally by STM for systems with preferential physisorption and chemisorption. Adsorption kinetics will be explored with quartz microbalance. Enantioselective oxidative coupling of prochiral monomers to chiral dimers will be performed on spin-polarized electrodes. Conglomerate-forming atropisomers and conformers with various racemization barrier will be used to study their nucleation on various spin-polarized substrates. Enantiomeric excess will be correlated with molecular systems, crystallization conditions, and spin-polarization. Interactions between enantiomers and spin-polarized surfaces will be studied by contact angle measurements. Reaction products will be analyzed by NMR and MS. Enantiomeric excess will be measured by chiral HPLC. Experiments will be repeated to ensure reproducibility.

Applicant profiles: Synthetic chemist with a sound knowledge of organic chemistry, physical chemistry and materials sciences. To register to the doctoral program, the candidate must own a Master Degree in chemistry equivalent to the one delivered by ULB. Specifically, must have received a sound education in chemistry covering the fields: general chemistry, physics, mathematics, biology, earth science, mineralogy, crystallography, equilibrium thermodynamics, kinetics, biochemistry, analytical chemistry, inorganic chemistry, organic chemistry, spectroscopy, quantum mechanics, statistical mechanics, non-equilibrium thermodynamics, physical chemistry, and polymer chemistry.

Gross salary: For European Union citizens, the gross monthly salary of €2680 that roughly corresponds to a net monthly salary of €2350, to which a mobility allowance of €600 adds, corresponding to a total of €2950 per month. For non-European Union citizens, the gross monthly salary of €2764 that roughly corresponds to a net monthly salary of €2642, to which a mobility allowance of €600 adds, corresponding to a total of €3242 per month.

How to apply? Please, follow the application procedure described in the recruitment leaflet available at www.cisse-msca.eu