Call for Master 2 Internship at CERMAV-CNRS (6 months)

Project title: Conception of Novel Polysaccharidic Affinity Membranes towards Highly Efficient Chiral Resolutions

Period: January 2020 – June 2020 (6 months). Depending on the result, there is a possibility to continue this project as her/his PhD thesis study for 36 months (2020-2023) financed by CERMAV.

Laboratory: CERMAV-CNRS (UPR 5301), Grenoble Alpes University, France

Address: 601 Rue de la Chimie, 38610 Gières, France

Research team: Self-assembly of glycopolymers group / Structure and properties of glycomaterials group

Project director: Dr. Issei OTSUKA (CR-CNRS, HDR)

Project partner: Dr. Yu OGAWA (CR-CNRS), Dr. Yoshiharu NISHIYAMA (DR-CNRS, HDR), Dr. Karim Mazeau (DR-CNRS, HDR)

Objectives of the internship:
This project focuses on an emerging research topic in chemical and biomedical industries, i.e. chiral resolution of valuable racemic compounds. The goal of the project is to develop a membrane-based filtration strategy that enables large-scale continuous separation of valuable chiral compounds such as drugs and food additives. This internship focuses on the synthesis of various polysaccharide derivatives that are inherently chiral and the preparation of their membranes mainly via electrospinning technique.

Educational interests and skills:
The trainee will have hands-on experience in chemical modifications of polysaccharides and their characterizations by means of NMR, IR, SEC, UV-vis, etc. She/He will then work on the membrane preparations using her/his own products by combining several approaches including electrospinning and learn structural characterizations of materials by electron microscopy and X-ray diffraction analyses, as well as for the filtration behaviors.

Abstract:
Many biologically interesting compounds are chiral and their physiological properties rely on this chirality. For example, *S*-enantiomer of *Thalidomide* causes births of malformed babies while the *R*-enantiomer is a useful drug. Currently the chiral separation is achieved by High Performance Liquid Chromatography (HPLC) with chiral columns packed with cellulose derivatives as Chiral Stationary Phases (CSPs) that are commercially available. Despite the high efficiencies, the HPLC method presents serious disadvantages of being typically discontinuous, not scalable and time-consuming. Thus, it is important to develop a scalable chiral separation technology. In this context, this project pursue nanofiltration-based approach using nanofibrous cellulose-based membranes having high surface-area-to-volume ratio that should improve enantioselective interactions with the target molecules.

Approaches & materials:
Classical HPLC stationary phase polymers such as cellulose and amylose derivatives for the chiral HPLC will be prepared via functionalizations of their hydroxyl groups based on established protocols. The products will be electrospun to prepare chiral-recognizable nanofibrous membranes. Technical parameters of electrospinning (applied voltage, solution feed late, etc.) will be optimized to form defect-free continuous nanofibers and their nonwoven membranes, which will be characterized for their filtration behaviors.

Background and skills expected for the candidates:
Candidates with background in polymer/organic chemistry (synthesis and basic physicochemical characterizations such as NMR, IR, UV-vis, SEC, etc.) are preferable.

Interested candidates should send their CV and motivation letter to I. Otsuka (issei.otsuka@cermav.cnrs.fr) by e-mail.