Secteur des Sciences et Technologies

Invitation à la soutenance publique de thèse de

Yazhou LIU

Master degree in Science

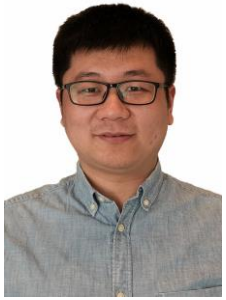
Pour l'obtention du grade de Docteur en sciences

« Design, synthesis and characterization of ferrocene containing aromatic foldamers »

qui se déroulera
le mercredi 26 février 2020 à 16h
Salle Jean-Baptiste Carnoy
Place Croix du Sud, 4-5
1348 Louvain-la-Neuve

Jury members :

Prof. Michael Singleton (UCLouvain), supervisor
Prof. Raphaël Frédérick(UCLouvain), supervisor
Prof. Yann Garcia (UCLouvain), chairperson
Prof. Raphaël Robiette (UCLouvain), secretary
Prof. Olivier Riant (UCLouvain)
Dr. Yann Ferrand (Université de Bordeaux, France)
Dr. Laurent Provins (UCB Pharma)



UCLouvain

Project 1

Chalcones are a series of molecules containing an α,β-unsaturated ketone that connects two aromatic systems, and have been shown to have a variety of biological activities. Among these molecules, a new series of hybrid indole based chalcones have drawn great attention during the last decade for their novel biological activity such as inhibition of Aβ1-42 aggregates and tumor cell growth. However, due to the convenience of their synthesis, biological evaluations were performed primarily on 3 or 5 position indole chalcones.

Our group has developed a novel methodology which allowed facile construction of indole-2-aldehydes though tosyl ptotected 2-aminobenzylketones and dichloroethylene in two steps. Subsequently, a new approach of deprotection reaction for tosyl protected indole-2-aldehyde was also developed. Based on these, a series of indole based chalcones with different modification at indole C5 and C9 positions and the chalcone parts were obtained though aldol condensation. Biological evaluation of those series of chalcones on human leukemia HEL cells and breast cancer MDA-MB-231 cells indicated a phenyl group at the indole C9 position and a p-pyridine on the chalcone showed the best inhibition.

Project 2

α-Helix and β-sheets are the two main secondary structures found in proteins. Among them, bent β-sheets play key roles in the active sites of many proteins and are involved in molecular recognition, metabolic pathways and cell signaling. Compared to the large amounts of research aimed at simulating helical structures, examples of AOFs mimicking sheet-like structures are rare. Most reported structures have relied on rather rigid turn-units to orient the aromatic strands in the same direction in order for them to interact. Still, the number of reported turn-units for this purpose is small. Moreover, in some cases the distance initially enforced between the strands is not ideal for good π-stacking. To this end, we were curious if ferrocene dicarboxylic acid could be a suitable turn-unit for the development of AOF β-sheet mimics.

By incorporating ferrocene into aromatic oligoamides we successfully obtained a series of ferrocene containing AOFs for β-sheet mimics. The focus of my work was to study structural factors (size, type, shape of aromatic rings) or host-guest interactions that could give stable conformations or potentially allow exchange between multiple conformations. Through combined NMR, X-ray and computational studies, we first revealed that for one of the series of oligomers, we can obtain a good preference for stacked sheet-like structures that show sequence dependent guest recognition. Additionally, one oligomer also showed a stablized sheet-like conformation both in solid and solution due to the H-bonding network with water.