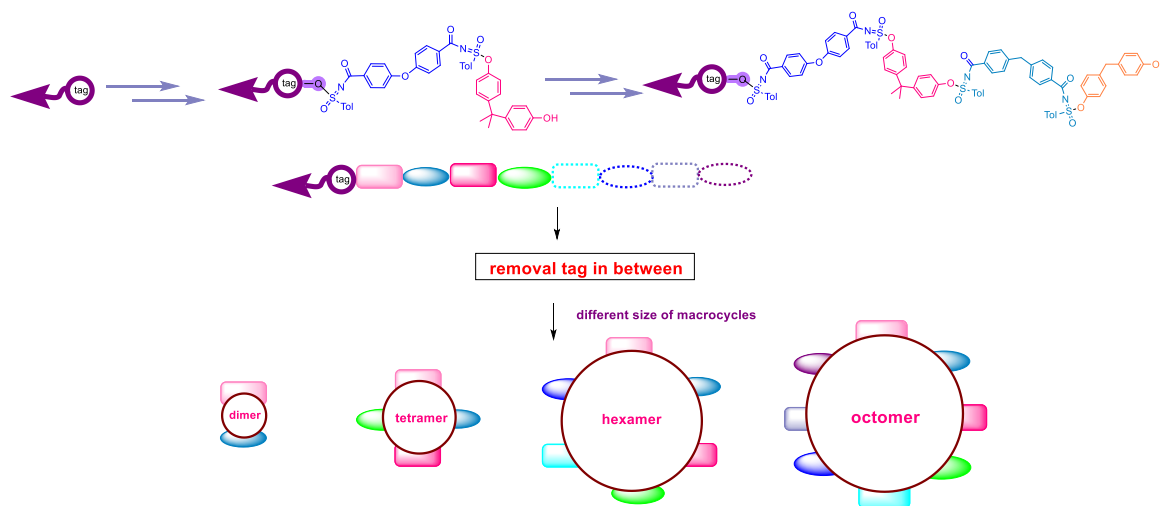


Group : Laboratory of Organic Chemistry
Project : **Sequence-defined macrocycles via Sulfur-fluoride exchange reaction**
Supervisors : Yu Han, Fedor Miloserdov, Han Zuilhof

Keywords. Macromolecules synthesis, SuFEx click reaction, fluorine-tag strategy

Introduction. The nature has many biological polymers, such as proteins and nucleic acid. These kinds of biopolymers have perfectly defined length and sequences. We call these uniform macromolecules as sequence-defined oligomers or polymers.^[1] Sequence-defined oligomers are of great importance and regarded as holy grail in polymer science.^[2] Because of its great potential, chemists have devoted to developing the methods to synthesize man-made sequence-defined polymers. Click reaction^[3] is one of the most popular types of reaction in growing the sequence-defined oligomer chains owing to its fast reaction speed, high yield and conversions which could enable the polymer chains grow longer in a short time. Sulfur-fluoride exchange reaction (SuFEx) is another click reaction reported by Sharpless in 2014.^[4] Currently, we exploit SuFEx click reaction to synthesize man-made sequence-defined oligomers and we are perusing a higher control to the synthesized sequences.

Goal. Recently, our group synthesized SuFEx-based oligomers with different sequence and length. Intriguingly, we found the cap on the oligomer chain might be removed effectively by Sulfur-Phenolate Exchange reaction (SuPhEx).^[5] In this thesis project, we planned to connect the tail and the head of the linear sequence by SuPhEx reaction to make sequence-defined macrocycles with different ring sizes. The appropriate monomers of di-SF and di-phenol with long enough chains, flexibility and solubility will be investigated in growing oligomer chains and the reaction condition of forming different sizes of macrocycles will be tuned.



Topics to be studied. This project will exploit SuFEx reaction to grow the linear oligomer chains with different length and sequence and perfluoro-tagging technique to simplify the purification process. Furthermore, the SuPhEx reaction will be used to remove the chains and form the macrocycles with different ring sizes.

Techniques to be used.

Organic synthesis under inert atmosphere, Fluorous-solid phase extraction (FSPE), TLC, column chromatography, NMR, GPC, HR-Mass.

Contact details: Fedor Miloserdov, room Helix 7026, email: fedor.miloserdov@wur.nl

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