

# Synthesis and studies of enantiopure fluorescent sensor molecules

(Summary of PhD thesis)

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My doctoral work was focused on the synthesis and spectroscopic studies of enantiopure fluorescent sensor molecules having potential enantiomeric recognition ability or selective ion sensing properties, which may be suitable for constructing optical sensors. We synthesized unreported receptors and investigated their complexation properties toward the enantiomers of deprotonated carboxylic acids, protonated primary amines and amino acid esters, and in one case, toward metal ions and achiral anions as well. Acridone, 5,5-dioxophenothiazine, benzothiazole or pyrene fluorophore unit was used for signaling the molecular recognition of the receptors.

Bis(urea) and bis(thiourea) type compounds could be applied as anion sensors for the recognition of the enantiomers of biologically important deprotonated carboxylic acid derivatives. We demonstrated that the difference of urea and thiourea units had a great effect on the degree of enantiomeric discrimination [1, 2].

A sensor molecule containing an acridone moiety as well as amide and ester groups showed selectivity toward  $F^-$ ,  $Ca^{2+}$  and  $Hg^{2+}$ . Using the optical responses of the compound for  $F^-$  and  $Ca^{2+}$ , we established double chemical input / single optical output molecular logic gates [3].

Pyridino-18-crown-6 ether-based sensor molecules containing a benzothiazole fluorophore had moderate or appreciable enantiomeric recognition abilities toward the enantiomers of protonated primary amines [4].

Newly synthesized aza- and diaza-18-crown-6 ethers containing a pyrene fluorophore formed complexes with protonated primary amines and amino acid esters, which resulted in large fluorescence enhancement due to the inhibition of the photoinduced electron transfer (PET) process. We proved that the diazacrown ether containing an *N*-formyl group formed significantly more stable complexes with the studied protonated amino acid esters than with the protonated primary amines [5].

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