

## Master's Thesis project

### Synthesis and characterization of fluoroionophores for optical sensing of $K^+$ and $Na^+$

#### Scientific background

Precise monitoring of physiologically important *ions* in body liquids is essential for diagnostic of various diseases and disorders. *Optical sensors* represent advanced analytical tools that benefit from a variety of formats (from fiber-optic sensors to nanoparticles) and low cost. *Fluoroionophores* are molecules that combine a fluorescent dye and a selective ion receptor. Coordination of a metal ion to the appropriately designed receptor induces *fluorescence response*. In the last decade substantial progress has been made in development of *fluoroionophores for  $K^+$*  [1] *and  $Na^+$*  [2,3] that are among 6 most important ions for medical and biological applications. However, further improvements in respect to sensitivity and simplicity of synthetic procedures are necessary to enable whole range of applications.



#### What we offer

The main goal will be the synthesis and characterisation of  *$K^+$  and  $Na^+$  fluoroionophores* combining attractive spectral properties, high selectivity and sensitivity to the ion of interest. In this thesis, you will become familiar with experimental techniques used for the synthesis and characterization of dyes, receptors and fluoroionophores. You will also gain knowledge of luminescent materials and their characterization.

#### Requirements

Study programme: Chemistry or Technical Chemistry, good synthesis skills (Schlenk line), self-organized and independent way of work, experience in fluorescence spectroscopy is a plus.

#### Terms

**Duration of practical work:** 6 months **Starting date:** now **Payment:** 440 €/month

#### Contact

**Assoc. Prof. Sergey Borisov**  
Institute of Analytical Chemistry and Food Chemistry  
Stremayrgasse 9, 8010 Graz  
E-Mail: [sergey.borisov@tugraz.at](mailto:sergey.borisov@tugraz.at)

#### References

- [1] B. J. Müller, S. M. Borisov, I. Klimant, *Advanced Functional Materials* **2016**, 26, 7697.
- [2] B. J. Müller et al., *Analytical Chemistry*, **2017**, 89, 7195.
- [3] V. Juvekar et al., *Chemical Communications* **2021**, 57, 8929.