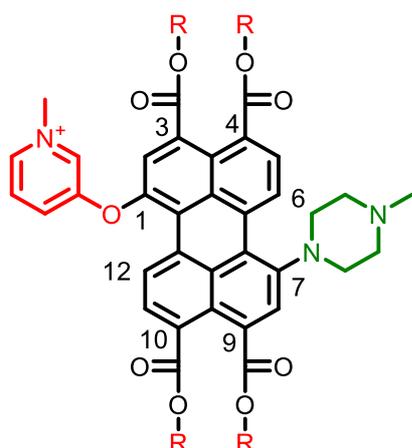


## Fluorescent Perylene Probes



### Design, synthesis and applications of fluorescent probes based on perylenes

Perylene dyes are the most stable organic chromophores known to man.<sup>1</sup> These compounds absorb strongly in the visible and exhibit an exceptional efficient fluorescence with fluorescence quantum yields approaching unity. That means that every absorbed photon is emitted at a different wavelength! Perylenes can be functionalized at the so-called peri- (3,4,9 and 10) and the bay positions (1,6,7 and 12). We have developed the synthetic methodology to achieve independent substitution at all positions in an easy, efficient and straightforward manner,<sup>2</sup> and have made very efficient pH probes already.<sup>3</sup>

Here we want to exploit this knowledge by attaching receptor groups for the detection of various analytes at the perylene scaffold. If different receptor groups are combined, the resulting molecule will be able to detect multiple analytes simultaneously and can thus be regarded as a “lab on a molecule”.<sup>4</sup> In this project we will also pay attention to the solubility of the fluorescent probes and make serious attempts to construct water-soluble probes.

This project is mainly experimental. As a BSc project, the work will be mainly focused on organic synthesis, with limited spectroscopy. As a MSc project synthesis and spectroscopy will be more balanced.

<sup>1</sup> Huang, C.; Barlow, S.; Marder, S. R. *J. Org. Chem.* **2011**, *76*, 2386–2407.

<sup>2</sup> *Highly Efficient Synthesis of Regioisomerically Pure 1,7-Dibromo Perylene-3,4,9,10-Tetracarboxylic Acid Derivatives*. Sengupta, S.; Dubey, R. K.; Hoek, R. W. M.; van Eeden, S. P. P.; Gunbaş, D. D.; Grozema, F. C.; Sudhölter, E. J. R.; Jager, W. F. *J. Org. Chem.* **2014**, *79*, 6655–6662.

<sup>3</sup> *Fluorescent PET probes based on perylene-3,4,9,10-tetracarboxylic tetraesters*. Dubey, R. K.; Knorr, G.; Westerveld, N.; Jager, W. F. *Org. Biomol. Chem.* **2016**, *14*, 1564–1568.

<sup>4</sup> D. C. Magri, G. J. Brown, G. D. McClean and A. P. de Silva, *J. Am. Chem. Soc.*, **2006**, *128*, 4950.