

## 6 Summary (*Englische Zusammenfassung*)

In the present thesis concepts for quantifying the polarity of the microenvironment of fluorescent molecules in dendrimers were developed. To accomplish the project, model compounds were planned and transferred into chemical structures. The concept is based on the generation specific fitting of fluorescent probes with high solvatochromism and their corresponding dummies into dendrimers. As illustrated in the architect's image on page 13, five probe- and dummy-pairs of the first dendron generation were prepared. Every received pair was examined for its fluorescent and chemical properties.

The Suzuki cross-coupling was the main reaction for the construction of all dendrons. The dendrons were equipped with orthogonal protecting groups. Selective deprotection in the periphery or at the focal point was feasible without difficulty. The partial deprotected G1-probe- or dummy-containing dendrons were combined to G2-dendrons **50**, **51**, **112**, **113** and **125** via peptide- or esterbondings. Subsequently, G2-dendrimers **67**, **116** und **128** were synthesized. With those it was proved, that there was no excimer formation, when the molecules were excited. Molecule **67** is the first known dendrimer in literature with a pyrene containing core.

The results of the fluorescence experiments were, that the probes with two electron acceptor groups had the best properties. The solvatochromic shift between different solvents was very strong. The biggest difference in the fluorescence maxima in methylcyclohexan and acetonitrile was 185 nm. The solvatochromic sensitivity of probe **119** was so well-defined, that the different fluorescent wavelength, appearing in different solvents could be seen with the human eye. In order to convert a probe into a dummy it was sufficient to place a methylene group between the donor unit pyrene and the acceptor groups. An alternative successive way to get a dummy with excellent properties was the use of tetrahydropyrene instead of pyrene. The tetrahydropyrene dummy actually had the best fluorescence properties. Consequently a selective excitation of the probe in presence of the dummy was possible. The absorption of the tetrahydropyrene dummy was finished in the area of the absorption maximum of the corresponding probe **119**.

Lastly first measurements were conducted with probe **119**, placed in different dendritic structures. The probe was placed in the first generation of **119**, **125** and in dendrimer **128**. The fluorescence wavelength was shifted in acetonitrile from 531 nm in the smallest dendron to 509 nm in the biggest structure. Perhaps this is the first hypsochromic shift, induced through the dendritic interior. This experiment proved to

be so promising that in near future our system might be able to quantify the micro polarity of the interior of dendrimers and to give a statement on the direction of the polarity gradient in our dendrimer system.