FUNCTIONALIZED OLIGOMERS AND POLYMERS LANGMUIR-SCHÄFER FILMS FOR SENSING APPLICATIONS

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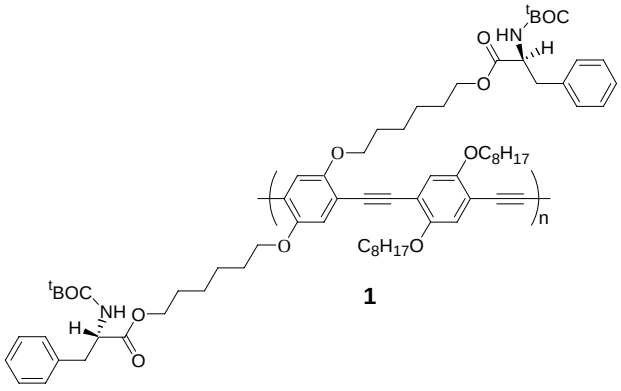
Langmuir-Schäfer (LS) and cast thin-films of poly[1,4-(2,5-dioctyloxyphenylene)-2,5-thiophene] have been prepared and employed as active layers in chemical sensors. Their field-effect properties have been studied, the LS films showing superior performance level with the highest field-effect mobility attained so far with an alkoxy substituted conjugated polymer. This performance has been attributed to the higher conjugation achieved with the LS method on the basis of investigation by surface sensitive spectroscopy and microscopy tools. More in particular the LS technique allows to deposit a multi-layered thin-film composed of *trans* planar poly(alkoxy-phenylenethienylene) chains, whereas in the cast film the polymer chains spontaneously arrange mainly in the non-planar *cis* configuration. This investigation provides also insights into the structural and field-effect properties of the regioregular alkoxy-phenylene conjugated copolymers, poorly investigated so far despite the wealth of opportunities offered by the alkoxy phenyl linkage for convenient chemical and biological tailoring.

Such investigation has prompted also the use of other similar derivatives for on-line chiral discrimination, a challenging issue with enormous potential for pharmaceutical and medical applications. In this context, conjugated oligomers and polymers functionalized with chiral small bio-molecules represent a suitable class of active materials. The contribution will describe also recent results on the applications of such kind of compounds in enantio-selective sensing devices.

Poly(aryleneethynylene)s (PAEs) bearing protected glucose, amino-acid (**1**) or nucleoside molecules as side groups have been syntesised. Quartz crystal microbalance gas sensors with some of these PAEs as sensing layer have been used for enantiomeric recognition, demonstrating the chiral discriminating ability of the side units.

More recently, we have focused on phenylene-thiophene structures, that show good performances in transistor devices, and we have prepared oligomers functionalized with protected amino-acids or glucose molecules (**2**) in different positions. We have used these materials as active layer in the fabrication of the first enantioselective thin film transistor sensor, which represents also the first solid state-based sensor performing chiral recognition at concentration levels as low as few tens of ppm.



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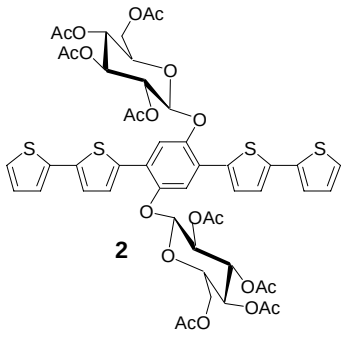

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