New π-conjugated nanoscale ladder polymers

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A fascinating class of polymers deals with π-conjugated ladder polymers (cLPs), which consist of an uninterrupted sequence of adjacent rings sharing at least two atoms. Therefore, the polymer does not break apart if one of the two strands breaks and cLPs are thus expected to possess a high resistance to thermal, mechanical and chemical degradation. [1] Furthermore, most cLPs own an exceptionally rigid structure, in which the two strands are held at a discrete distance defined by the spacer. This allows investigation of the influence of interchain interactions (H-type coupling) between the two π-conjugated strands as well as intrachain interactions (J-type coupling) within the strands and HJ-type aggregate formation by means of single molecule fluorescence spectroscopy.[2]

A fully π-conjugated, pyrene-based monomer was synthesized. The monomer was oligomerized according to the "zipping strategy" in a sequence of an acetylene-deprotection followed by an oligomerization under *Glaser-Eglinton* conditions and separation of the oligomers performed by gel permeation chromatography. The dimer and tetramer LP were obtained after deprotection using TBAF and closure of the second strand under *Glaser-Eglinton* conditions.

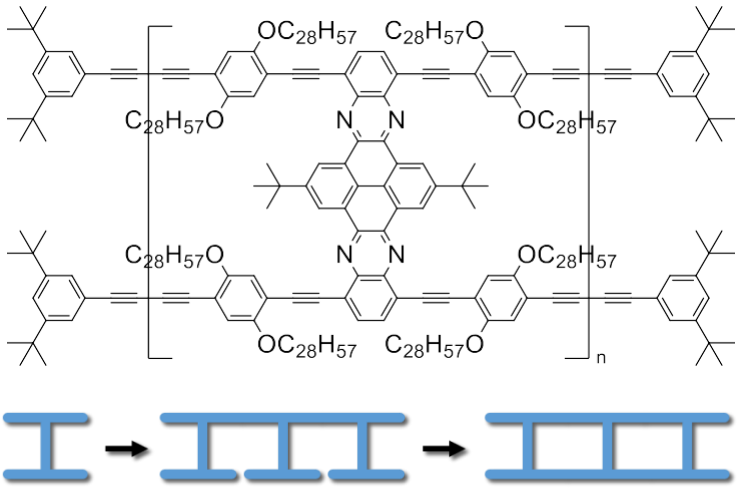

Figure 1: a) shows the structure of a new pyrene-based, fully π-conjugated ladder oligomer and b) a schematic illustration of the oligomerization strategy.

References:

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