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Light-responsive quinoline-foldamers with photo-switchable On/Off conductivity

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Molecular electronics based on single molecules or small molecular ensembles aim to define molecular properties for implementation in molecular-based devices, such as diodes, transistors, and switches, among others. However, integrating molecules into electronic devices whose conductivity can be reproducibly and reversibly switched using light is a challenge that still needs to be addressed.[1] In this context, helical foldamers are attractive as they combine through space and through bond charge transport.[2] They can be interfaced with molecular recognition sites to yield devices whose conductivity is modulated by the binding of guest,[3] or interfaced with inorganic ions to modulate the nature of the charge transport.[4]

With this in mind, we aim to study the on/off conductance of systems based on helical quinoline foldamers with different lengths organized as single monolayers on gold surfaces. The reversible photocycloaddition of two anthracene moieties is used to covalently modulate the helical backbone of the foldamer chain, Figure 1. The photoresponse was studied in solution for a better understanding of the characteristics of the materials and by conductive AFM on single molecule layers.

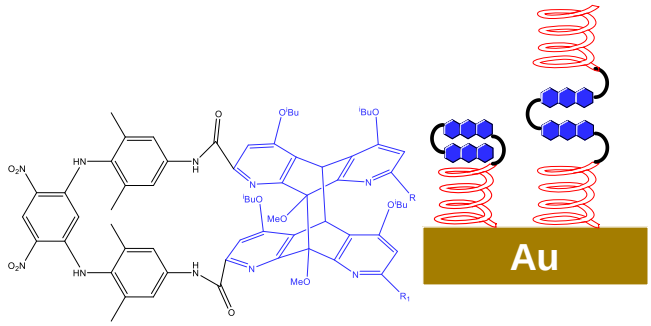

Figure 1-Photodimer of the anthracene moiety (R and R_1 remaining organic part of the foldamer) and foldamer monolayer representation on the gold surface.

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