SUPRAMOLECULAR TRIARYLAMINE SELF-ASSEMBLIES AS FUNCTIONAL NANOMATERIALS

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Supramolecular organic electronics rests on the use of bottom-up chemical self-assembly processes in order to design conducting components at the 5–100 nm scale. Challenges in this field are both the construction of 1D-nanostructures displaying optimized transport properties and their precise connections to electrodes. By externally controlling light-responsive supramolecular polymerization processes of tailored triarylamine molecules, and by using appropriate methods of orientation, we have now demonstrated that it becomes possible to pre-determine the accurate positioning of organic interconnects within patterned nano-circuitry.[1-3] Along this main line, we will describe the detailed mechanism of this very original self-assembly process.[4] We will also discuss the optical and electronic properties of these supramolecular polymers which reveal metallic signatures; the nature of their through-space conduction will be described. Furthermore, the supramolecular dynamics of these assemblies allows for the creation of novel soft materials not accessible with conducting conjugated polymers. In particular, we will show that some triarylamine-based nanofibers demonstrate a mechanism of defect repair driven by polaron diffusion through their supramolecular stacks.[5] Finally we will show that this light-triggered self-assembly process can be extended to a number of advanced triarylamine derivatives for the production of various nanostructures.[6-8]

References

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