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Solution-processable organic semiconductors based on anthracene as main components of active layers in OLEDs: Design, synthesis and application

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Well-defined, low molecular weight amorphous organic materials based on polyaromatic compounds exhibit interesting optical, electronic, and magnetic properties; whereas they can also serve as the basis for developing lithographic materials. Thus, they have been receiving attention for the development of organic devices in the nanoscale with substantially enhanced performance and new functions. Solution processability of such materials is highly desirable, since techniques, such as spin-coating, lower significantly the cost for the fabrication of the devices. Herein, a design strategy and synthesis of solution-processable small molecules, with well-defined monomolecular structures based on anthracene, is presented. Anthracene moieties are combined with other poly-functionalized planar and tetrahedral cores, providing control of physicochemical properties, such as solubility, thermal stability, and T_g. Selected members of this class, provided amorphous homogeneous films which were stable at temperatures up to 150°C. These molecules have been, also, evaluated as main components in the active layer of OLEDs, providing very promising results. Self-patterning was also allowed by incorporation of suitable acid-sensitive functional groups and a photoacid generator. These results demonstrate the potential of these materials to be used in the fabrication of patterned structures for OLEDs. A flexible, efficient and cheap methodology, suitable for the preparation of these anthracene-based molecules in large scale is also described, using representative examples.

Biography

Veroniki P Vidali is an Organic Chemist. She has completed her PhD at Agricultural University of Athens in 2004. She worked as a Post-Doctoral Fellow at Natural Products and Bioorganic Chemistry Laboratory/Institute of Nanoscience and Nanotechnology at NCSR "Demokritos" from 2004 to 2007 and as Scientific Staff from 2007 to 2017, while since 2017 she has been working as a Research Assistant at NCSR "Demokritos". Her main research interests include organic synthesis of bioactive natural products and polyaromatic compounds applied in nanotechnology. She has co-authored 18 peer-reviewed research articles in international journals and one book-chapter.

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