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Dipartimento di Scienze e Tecnologie Chimiche

SEMINARIO

Prof. Nazario Martín

Facultad de Química, Universidad Complutense and IMDEA-Nanociencia, Madrid, Spain

Chiral Molecular Nanographenes

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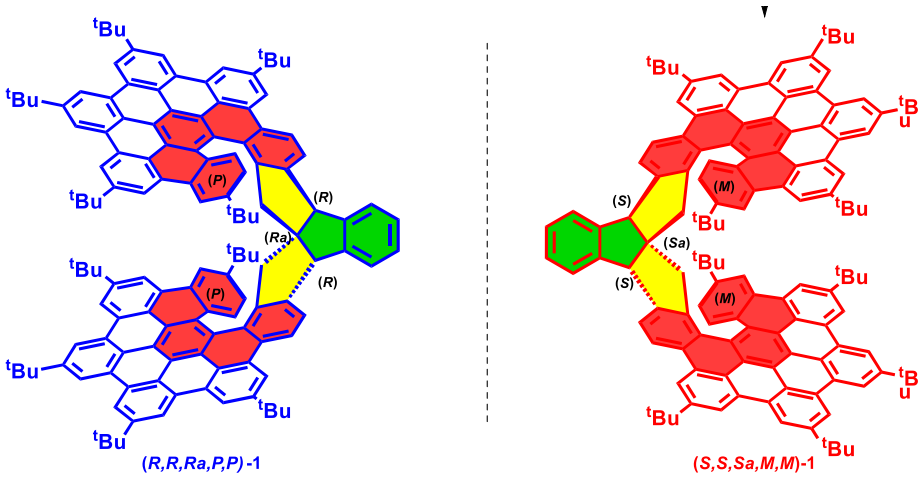
Chiral Molecular Nanographenes

Nazario Martín

Dpto de Química Orgánica, Facultad de Química, Universidad Complutense, E-28040; Madrid, Spain.
nazmar@ucm.es
IMDEA-Nanociencia, C/ Faraday 9, Campus de Cantoblanco, 28049 Madrid, Spain

Chirality is an important and fascinating concept which has not been properly addressed in carbon nanoscience [1]. We have previously reported the first inherently chiral bilayer nanographene with a helicene linker, both as the racemate and the M isomer [2,3]. Helical bilayer nanographenes (HBNGs) are chiral π-extended aromatic compounds consisting in two π-π stacked hexa-benzocoronenes (HBC) joined by a helicene, thus resembling van der Waals layered 2D materials. Recently, we have synthesized and compared [9]HBNG, [10]HBNG and [11]HBNG helical bilayers endowed with [9], [10] and [11]helicenes embedded in their structure, respectively. Interestingly, the helicene length defines the overlapping degree between the two HBCs (number of benzene rings involved in π-π interactions between the two layers), being of 26, 14 and 10 benzene rings, respectively, according to the X-ray analysis [4]. More interesting, this overlapping also controls the properties.

Compounds constituted only by carbon atoms, such as optically active molecular nanographenes have, so far, been obtained as racemates followed by time-consuming chiral chromatographic separations. In this presentation, an enantioselective strategy of a new bilayer nanographene which uses two pivotal stereocontrolled key synthetic steps to introduce and extend stereogenic elements into a polycyclic aromatic Csp^2-based structure will be discussed. The resulting helical core of six ortho-fused rings embedded in the nanographene ensures stereochemical stability and good chiroptic activity [5].



First enantioselective synthesis of a chiral nanographene by a precise enantiocontrol of an extended pattern of stereogenic elements.

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References

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