

Generating Porphyrin-Assemblies with Porphyrin-LEGO[®]

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In this lecture an approach to covalent porphyrinoid assemblies by the use of a basic construction kit is presented,^[1,2] called ‘porphyrin LEGO[®]’, which makes use of porphyrins ‘programmed’ for [4+2]-cycloaddition chemistry. Our specific strategy of ‘porphyrin LEGO[®]’ is based on symmetrical porphyrins with complementary ‘Diels-Alder’-reactivity at the pyrrolic beta-positions, a set of which were designed and prepared.^[1,3] First, symmetrical tetrasulfoleno-porphyrins were designed as ‘masked’ diene-components, to be applied in reactions with various dienophiles for [4+2]-cycloaddition reactions, such as fullerenes.^[1,4] Quinono-porphyrins were then developed as porphyrins with complementary dienophilic reactivity.^[2] Using such porphyrinoid building blocks, symmetric multi-functionalized di-porphyrins,^[2] tri-porphyrins, etc. have been built-up. A selection of the di-porphyrins, tri-porphyrins, etc. obtained, are scaffolds, themselves, ‘programmed’ for subsequent Diels-Alder steps. They feature new chromophore-types, which also represent (e.g.) molecular reservoirs for reversible loading with a multitude of electrons. Logical extensions of this approach promise to open synthetic routes to a variety of covalent porphyrin-based nanoscale objects.

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