Functional nucleic acid-peptide nanostructures assembled by host-guest systems for nanotechnology applications

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ICIQ People | Luis Escobar

Budget | 297,900 €

Call | Junior Leader La Caixa

SUMMARY

Supramolecular polymeric nanostructures are comprised of building blocks held together by directional and reversible noncovalent interactions, which provide internal order but also dynamic behavior. Owing to these characteristics, they feature appealing properties, such as self-healing, recyclability, and adaptability. Interestingly, supramolecular polymers based on biological scaffolds (nucleic acids, proteins, and carbohydrates) are abundant in Nature and essential to Life. Nevertheless, the use of these supramolecular polymers in nanotechnology applications is still limited, since the functions of the incorporated biological scaffolds are mainly dedicated to building the supramolecular architectures.

The research group designs and develops hybrid building blocks that combine biological scaffolds, such as nucleic acids and peptides, with macrocyclic synthetic receptors to build novel supramolecular polymers. In this approach, the incorporated synthetic receptors hold together the supramolecular architectures, whereas the functions of the biological scaffolds are available for practical applications. In particular, we are interested in the use of these hybrid supramolecular polymers for health applications, such as sensing devices and transmembrane drug carriers, with the aim of contributing to the advance in the diagnosis and treatment of certain diseases.

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