Self Assembled Designed Proteins For The Organization Of Gold Nanomaterials

P05-03

E. López[I], J. Kumar[I], A. Aires[I], S. H Mejías[II], L. Liz-Marzán[I], A. L Cortajarena[I]

[I]CIC biomaGUNE, Donostia-San Sebastian, Spain, [II]IMDEA Nanociencia, Madrid, Spain

Biotechnology is a powerful tool to develop a wide variety of biomaterials with the added value of new functionalities, which can be achieved using a rational design approach. The bottom-up construction of complex and designed nanostructures allows controlling the organization of different elements based in the principles of modular self-assembly. Repeat proteins are an excellent option as basic construction components for these biomaterials due to their modular assembly properties and their large potential for functionalization with the addition of different reactivities[1]. In particular, we use consensus tetratricopeptide repeat (CTPR) proteins, based on 34 amino acids that form a TPR motif with a helix-turn-helix secondary structure. These proteins are easy to design and can be combined in a modular way in order to build a certain desired structure[2].

In our approach, we use CTPR proteins for templating two different gold nanomaterials: gold nanoparticles (AuNPs) and gold nanorods. This allows us to build conductive structures by organizing their components at nanoscale level in a controlled way, for their uses in nanoelectronics and plasmonics[3]. The main goal of this work is to demonstrate that CTPR proteins can be used as scaffolds for patterning gold elements and that they can provide not only precise order at the nanoscale but also new properties to the gold nanomaterials, such as chirality, which are intrinsic features of proteins.

[1] Mejías SH, Lopez-Andarias J, Sakurai T, Yoneda S, Erazo KP, Seki S, Atienza C, Martín N, Cortajarena AL. Chem Sci, 2016, 7(4842-4847).
[2] Mejias SH, Aires A, Couleaud P, Cortajarena AL. Adv. Exp. Med. Biol., 940 (2016) 61-81.
[3] Mejías SH, Coleaud P, Casado S, Granados D, García MA, Abad JM,Cortajarena AL. Colloids and Surfaces B,(2016) 141(93-101).