

2nd International Conference and Exhibition on
Materials Science and Chemistry
July 13-14, 2017 Berlin, Germany

Design and synthesis of hybrid nano-objects of unconventional morphologies

M Tréguer-Delapierre¹, C Chomette¹, S Gomez-Grana¹, V Many¹, C Hubert¹, S Mornet¹, J Majimel¹ & E Duguet¹, S Ravaine¹, P Barois¹, O Ersen², A Crut³, N Del Fatti³, F Vallée³ and R Alvarez-Puebla⁴

¹University of Bordeaux, ICMCB-CNRS, France

²IPCMS, France

³ILM, Lyon, France

⁴U.Tarragona, Spain

Combining material components of different nature in the same nanoparticle is a new challenge in Nanoscience and offers a wide range of new and largely unexplored possibilities for developing novel materials. In particular, proper design of the hybrid nanoparticle should permit a control over the interaction of the material components to combine different confinement-induced properties, create new ones or introduce new functionalization. In this presentation, we will focus on the synthetic route of metallo-dielectric components targeting sensing, photonic materials as well as super lenses. We will show how to build stable and robust raspberry-like nanostructures with close-packed plasmonic satellites with high purity and high reproducibility as well as their unusual optical properties. They exhibit numerous hot spots at satellite junctions, resulting in excellent surface-enhanced Raman scattering (SERS) performance as well as artificial optical magnetism properties at visible light frequencies. These properties are found to be highly dependent on their structure. Finally, we will evidence how to get control of positioning of each component with respect to the other by using the concept of patchy particles. By using dielectric particles with a well-controlled number of patches at their surface, we will show how the number and the location of the plasmonic satellites could be elegantly controlled in order to enhance the optical properties. The self-assembly of these elemental nanosystems offers new possibilities to create complex supracolloids for optical metamaterials or for the ultrasensitive screening of analytical targets, such as those relevant to medical and environmental sciences.

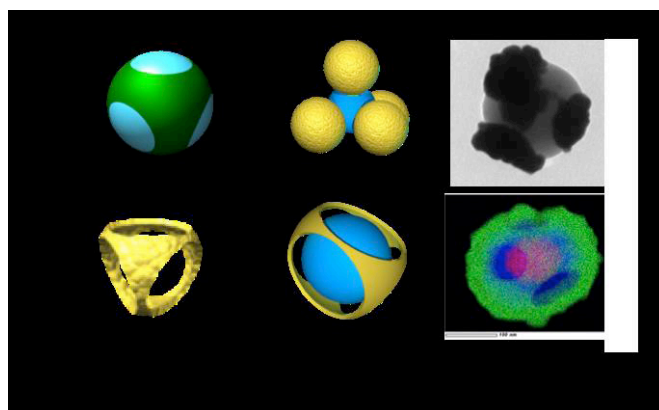


Figure 1: Examples of hybrid nanostructures of unconventional morphologies produced from the patchy particle

Biography

M Tréguer-Delapierre is an Associate Professor in Materials Chemistry at the University of Bordeaux. She graduated with a PhD in Physical Chemistry from the University of Orsay (South Paris) in 1999. She has received an award from the Chancellerie des Universités de Paris for her PhD thesis. After a Post-doctoral fellowship at the University of Notre Dame, Indiana (USA) with Dan Meisel, she joined the faculty as an Associate Professor in the Chemistry department at the University of Bordeaux, in 2000. Her current interest involves the synthesis of hybrid nanoparticles, mainly based on metal and semiconductor, with size and shape control and therefore with desired optical properties. Furthermore, her research is also focused on the surface modification and the directed self-assembly of the nanoparticles to improve their versatility.

treguer@icmcb-bordeaux.cnrs.fr