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Novel bottom-up sub-micron architectures for advanced functional materials

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DNA nanotechnologies had a major development during the last two decades. Their real potential and versatility began to be investigated and understood with the synthesis of a polyhedron-structured DNA molecule. Due to the intrinsic properties of DNA and developments in sequence design, different polyhedral, either in shape and/or dimensions were synthesised. Custom-tailored properties and high yields are characteristic of these structures. In this project, the main work was represented by the disposition, anchoring and imaging of self-annealed DNA polyhedron, with high yield and stability of the molecules. The last step consists in formation a gold layer on top of the pre-annealed DNA polyhedron, in order to build a specifically-patterned gold materials with optical responses. According to previous studies, specific strands of DNA sequence were designed, to anneal and form a geometric 3D tetrahedron, with >90% yield. The anchoring of the DNA structures was carried out on TEM carbon grids, where the structures where demonstrated to firmly immobilise on the surface. Hence, the gold layer deposition was carried out by electroplating, due to the conductive nature of the TEM grid employed. AFM and TEM are the predominant techniques carried out for characterizing the structures and their disposition on the substrates in each stage of this work.

Biography

Chiara Busa' has completed her scientifically oriented secondary school in 2005. She obtained her BSc in 2009 in Chemistry and Master's in Chemical Science in 2012 from the University of Florence (IT). She moved to Sweden, where she was consultant in Applied Physics at Chalmers University of Technology (SE). In 2014, she joined Pola Goldberg-Oppenheimer group (Advanced Nano-Materials, Structures and Application) to undertake her PhD in Chemical Engineering at the University of Birmingham (UK).

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