

Atomic Quantum Clusters: a new state of matter at the transition from bulk to atoms

M.A. López-Quintela

University of Santiago de Compostela. E-15782 Santiago de Compostela, Spain.

Atomic Quantum Clusters (AQC) are formed by a small number (< approx. 100) of atoms and represent a new family of compounds with novel and fascinating properties, which strongly differ in many cases from the properties of bulk and nanoparticles of the same material. For example, fluorescent, magnetic, catalytic, etc. properties have been found in sub-nm clusters, which are not exhibited for the same material in larger sizes. In the last years different soft chemical methods have been developed to synthesize these tiny compounds offering now the possibility to explore their novel properties in detail. In this talk I will summarize the state-of-the-art of this new field providing some examples of 1) some applications of relevant scientific and industrial importance and 2) how AQC can provide natural explanations of some unresolved questions in relevant fields like catalysis, etc.

References

B. Santiago González, M. J. Rodríguez, C. Blanco, J. Rivas, M. A. López-Quintela, J.M. Gaspar-Martinho. "One Step Synthesis of the Smallest Photoluminescent and Paramagnetic PVP-Protected Gold Atomic Clusters" *Nano Letters* **2010**, *10*, 4217-4221.

N.Vilar-Vidal, M.C. Blanco, M. A. López-Quintela, J. Rivas, C. Serra. "Electrochemical Synthesis of Very Stable Photoluminescent Copper Clusters" *J.Phys.Chem.C* **2010**, *114*, 15924–15930.

J. Selva, S.E. Martinez, D. Buceta, M.J. Rodriguez-Vazquez, M. C. Blanco, M. A. Lopez-Quintela, G. Egea. "Silver Sub-nanoclusters Electrocatalyze Ethanol Oxidation and Provide Protection against Ethanol Toxicity in Cultured Mammalian Cells" *J. Am. Chem. Soc.* **2010**, *132*, 6947–6954.

López Quintela, J. Rivas. "Anisotropic growth catalysed by AQC". *Spanish Patent Application* No. ES201000387, **2010**.

López-Quintela, J. Calvo, J. Rivas. "Synthesis of Subnanometric Nanoparticles". *Encyclopedia of Nanotechnology*, Bhushan, Bharat (Ed.), Springer Verlag, *to be published*.