Electrochemical synthesis and characterization of silver atomic quantum clusters of three atoms

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Atomic quantum clusters are materials formed by a small number of atoms, which give them unique properties due to quantum effects. The size of the clusters is less than one nanometer and they are totally different from the conventional nanoparticles and bulk metal. Besides, their properties strongly depend on the number of atoms making them very different from each other [1]. However, this great dependence on the cluster size, makes necessary the synthesis of very monodisperse clusters. This work presents the synthesis of silver clusters of 3 atoms, interesting due to their great properties on the therapeutic field, as they can improve the chemotherapy efficiency of classical antitumorals. [2].
Electrochemical synthesis is proposed in this case to obtain Ag3 clusters, controlling different parameters such us time, temperature or applied potential to adjust the reaction kinetics -key point of cluster synthesis-[3] in order to get a highly monodisperse Ag3. Furthermore, fluorescence spectroscopy is used to characterize the product. This technique is very useful in this case because it allows us to distinguish between the different cluster sizes by using the Jellium model. This study concludes testing the samples with the enzymatic activity of Hind III which confirms the Ag3 presence.

REFERENCES

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FIGURES

Figure 1: Fluorescence spectra of a silver three quantum cluster sample