

One-Step Generation of Core@Shell and Core@Shell@Shell Nanoparticles under Ultra High Vacuum Conditions

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Abstract

There is an increasing interest in the generation of well-defined nanoparticles (NPs) not only because of their particular properties resulting from their reduced dimensions, but also because they are promising building blocks for more complex materials in the fast growing nanotechnology [1]. As a consequence, the development of fabrication methods of high quality NPs is a key issue to follow the increasing demand of complex multifunctional nanoparticles for advanced applications [2].

We will present a bottom-up fabrication route based on the sputtering gas aggregation source that allows the generation of nanoparticles with controllable and tunable chemical composition and structure while keeping the control of their size. This technique, called Multiple Ion Cluster Source (MICS) [3], is an evolution of standard Ion Cluster Sources (ICS) [4].

Through examples, we will show that, apart from the generation of alloyed nanoparticles [5], the technique allows the generation of core-shell and core@shell@shell nanoparticles. All these possible combinations are generated in one single step process and under ultra-high vacuum (UHV) conditions, which leads to the formation of NPs with high purity.

References

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