

# NANOPARTICLES AS BUILDING BLOCKS FOR SELF ASSEMBLED NANOSTRUCTURES

Victor Puntes<sup>1,2,3</sup>

1 Institut Català de Nanociència i Nanotecnologia (ICN2), Campus UAB, 08193 Bellaterra, Barcelona, Spain.

2 Vall d'Hebron Institut de Recerca (VHIR), Hospital Vall d'Hebron, 08035 Barcelona, Spain

3 Institut Català de Recerca i Estudis Avançats (ICREA), 08010 Barcelona, Spain.

Spontaneous self-assembly of molecular and nanoscale objects reflects information coded in the individual components, it is an essential part of nanotechnology, and it has a central role in life; for example, the components of a cell replicate and self-assemble into another cell during mitosis. Therefore, some developments in nanotechnology strongly rely on a “bottom-up” self-assembly approach where devices comprised of individual molecules or nanoparticles perform functions analogous to those of current technology, which should deliver more efficient systems in terms of the energy needed to produce them and implementing Nature’s multifunctionality. Nanoparticles self assembly (SA) phenomena are commonly observed but only partially explained or understood. Thus, one important challenge is the ordered and controlled assembly of individual components. The remaining question being through which series of events the nanoparticles from a colloidal solution form the self assembled structures upon evaporation of the solvent. Some appealing examples are extended 2D monolayers, bimodal arrays, 3D super crystals of one or different types of particles, structures formed by applying an external magnetic field, chains and ring shapes, etc.