

Abstract:

Nanoparticles (NPs) and Nanoclusters (NCs, NPs with a diameter of <2 nm) have become invaluable assets in various scientific disciplines. The dimensions, surface environment and composition of nanoparticles are essential to their distinctive properties and catalytic features. Hence, developing methods to gain precise synthetic control over these features is of considerable interest. Motivated by the challenges involved in NP and NC synthesis and inspired by supramolecular metal catalyst pre-organisation strategies developed in our group, we were curious if we could employ self-assembled $[M_{12}L_{24}]$ nanospheres as templates for controlled nanocluster and nanoparticle synthesis. The goal of the research in this thesis was to explore and develop new synthetic methods for the precise preparation of (mixed) metal nanoparticles and nanoclusters through supramolecular pre-organisation. We herein describe a new synthetic strategy involving the pre-organisation and subsequent hydrogenation of organometallic complexes within $[M_{12}L_{24}]$ nanospheres, leading to the templated formation of encapsulated nanoclusters or nanoparticles that reside in a unique microenvironment.