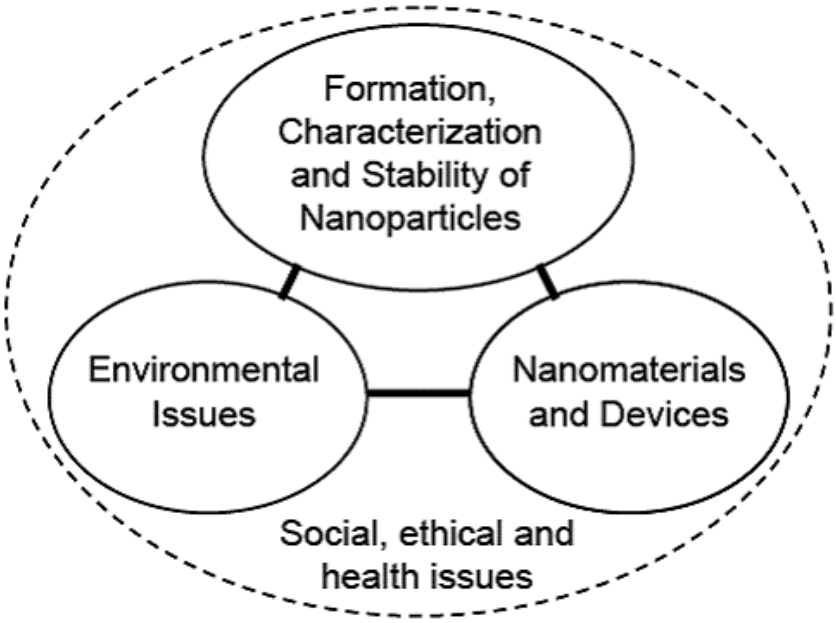
# Nanoparticles in Interactive Environments

## Research Areas

The research carried out within the Platform falls into 3 strongly interacting main areas:




1. **Fundamental Studies of the Formation, Characterization and Stability of Nanoparticles**

Here the focus is on the formation and properties of the nanoparticles themselves. We are interested in the interactions between charged and neutral particles leading to cluster, nanoparticle and nanotube formation, the details of energy couplings within the particles and the interactions between them.

Experimental research using state-of-the-art laser and molecular beam apparatus is combined with theoretical studies ranging from *ab initio* quantum chemical and DFT approaches to molecular dynamics simulations , statistical thermodynamics and Monte Carlo techniques.

## 2. The Role of Nanoparticles in the Environment

This can be the adsorption of trace metals by natural aquatic nanoparticles, aerosol formation in the atmosphere or catalytic particles in environmental technology applications. The connecting thread is the unusual reactive properties particles on the nanoscale. Questions of particle formation, aggregation and reactivity are of extreme

Importance for understanding the influence such particles can have on our environment. Research groups with experimental and theoretical expertise in fundamental studies of cluster/nanoparticle nucleation, coalescence and aggregation; techniques and expertise for studying the structure, stability and reactivity of such particles in interactive environments and more applied activities in areas of environmental concern will be brought together to apply fundamental “know-how” and analytical techniques to problems of the “real world”.

## 3. Nanoparticles for Applications in Nanotechnology

Here the emphasis is on developing techniques for controlled formation of nanodevices and the exploration of novel properties related to their nanoelectromechanical and photonic properties. In this case, the nanoparticles are exposed to an interactive external environment which can be e.g. an electromagnetic field. These activities combine experimental studies (making use of the extensive clean room facilities at MC2, Chalmers) and theoretical modeling of NEMS systems.