# What is the colloidal template role in the control of size and shape of nanocrystals?

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In this presentation we will discuss the role of the template to control the particle size and shape. This will be based on reverse micelles and other templates. With some discrepancies, reverse micelles are a rather good candidate for controlling the size of spherical nanocrystals. However, they are not the determining factor in controlling the shape of inorganic materials. Crystal growth on the nanoscale seems to follow behavior similar to that of the bulk phase with a marked dependence on pH. The latter is particularly important when some impurities are present in the growth medium because it influences, e.g., the formation either of zwitter-ions or of complex ions, the efficiency of which is greater than that of the initial impurity. These elements lead to a decrease in the growth rates of certain crystal faces. These conclusins are based on data obtained with copper nanocrystals produced by using $Cu(AOT)_2$-isooctane-water solution as a template. Even if the template does not change with various salt additions, the nanocrystal growth markedly depends on the salt used. It is demonstrated that chloride ions enable the growth of nanorods with an aspect ratio varying with chloride concentration. Conversely, only a slight amount of bromide ion is needed to increase the nanorod aspect ratio from 3 to 5 without any changes when increasing the bromide ion concentration. A rather large number of cubes are produced. Formations of nanorods and cubes are explained in terms of anion adsorption on (111) and (100) faces, respectively. By replacing chloride by other ions, the morphology of copper nanocrystals drastically changes. In all cases the nanocrystals formed are fcc single crystals with a polyhedral shape or crystals composed of fcc tetrahedra (deformed or not) bounded by (111) faces. Some cylinders are formed by the connection of 2 different crystals with different 5 fold axes and/or with additional planes. This gives rise to various particle shapes.