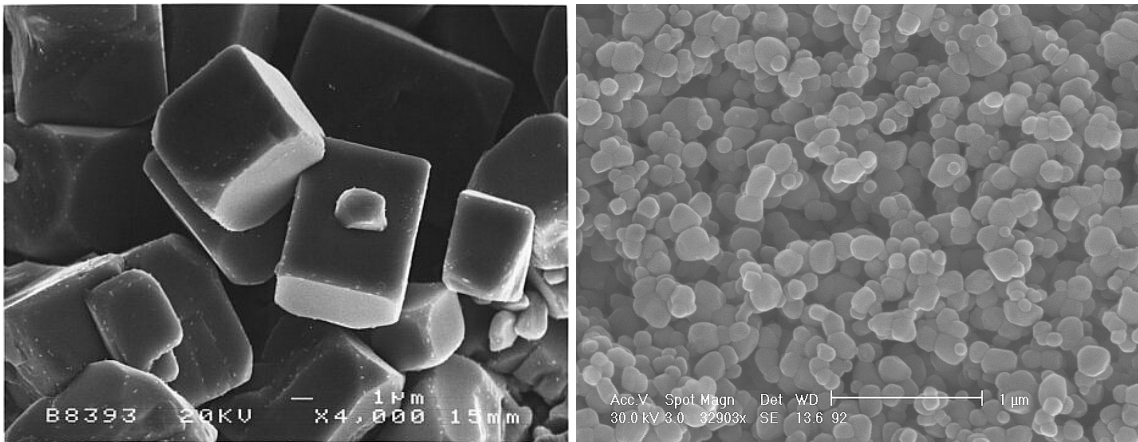


# Synthesis of Monodispersed Ceramic Powders with Exotic Shapes

The interest in monodispersed colloids dates back more than a century to the studies of Michael Faraday. Uniform coating of narrowly distributed colloids is the coating of fine particles with compounds of different chemical properties. The purpose of the process is to modify the surface characteristics of the original dispersed solids. In addition, the process can be used to prepare particles of a certain shape that cannot be achieved directly. The cores having the desired shape are prepared and coated with a material that has the required chemical properties to give the preferred surface properties of the fine particle.

Fine ceramic particles are of particular interest as several of them are widely used as principle constituents in chemical products and electronic devices. Small particle size is needed because large particles have a propensity to fracture. Hollow powders with submicron size and extremely thin walls are used in most applications. There are currently many ongoing efforts to make powders with excellent chemical homogeneity, specific size and shape, particle distribution, etc. The chemical properties of the solution and the method of preparation of the powders affect the size and shape of the final particle. The temperature of the solution, the pH, surface energy, surfactants, choice of solvent, etc. are some parameters that influence the final shape of the particles. Studying these influences could lead to a better understanding of monodispersed powders synthesis. This project will explore these aspects in the case of a few technologically important ceramic systems, such as cerium oxide, titanium oxide and zinc oxide.



The project is available as an honors research or special topic project for undergrads. It would give the student an excellent hands-on experience with the synthesis of nanoceramics with exotic morphological features and an opportunity to use sophisticated instruments such as zetaphoremeter, autoclave, particle size and surface area analyzer, TG/DSC, XRD, and scanning and transmission electron microscopes, etc. If interested, please contact me at: [Abdul Majeed.Azad@UToledo.Edu](mailto:Abdul Majeed.Azad@UToledo.Edu) or 530-8103.