



Contribution ID: 172

Type: Poster

## CALCIUM CARBONATE NANOPARTICLES IN DRINKING WATER

Drinking water is a vital resource. Assessing water quality is a health issue. Harmful substances such as heavy metals need to be in concentrations low enough for safe human consumption. It is also necessary to monitor other water characteristics. For instance, water hardness, related with calcium carbonate concentration, has an impact in detergent use and scale formation.

With the advent of nanotechnology concerns have arisen related to the effect of nanomaterials on health and the environment. Several studies have focused on the toxicology of nanoparticles. Water quality needs to be assessed not only to look for harmful substances in atomic or ionic states, but also in the form of nanoparticles. The monitoring of water is of special importance in desertic or semi-desertic regions where water sources are scarce. There is also a need to study and improve water quality in the wake of environmental accidents or in polluted places.

In this work, we present an electron microscopy analysis of nanoparticles found in drinking water in two sites in Sonora, a state located in the Sonoran desert in Northwest Mexico. The chosen sites are along the Sonora river basin. A major mine spill in August 2014 is a source of concern regarding water quality in this region.

High-resolution transmission electron microscopy reveals the presence of a significant amount of amorphous calcium carbonate (ACC) nanoparticles in the studied water samples. Interestingly, these particles undergo a crystallization transition when illuminating with the electron beam. We also conducted a systematic experiment to study the effect of pH on the morphological changes of ACC. We varied the exposure time and the heat source using light and observed different agglomeration formations of particles on a substrate.

Finally, we discuss possible health and technological issues related to the existence of ACC nanoparticles in drinking water.

### Keywords

Calcium carbonate, nanoparticles, drinking water, Transmission electron microscopy

### Reference

The Physics and Physical Chemistry of Water, Felix Franks, ThriftBooks, 1995.

### This work was supported by

Conahcyt y Universidad de Sonora

### Author approval

I confirm

### Author will attend

I confirm

**Authors:** MALDONADO ARCE, Amir Darío (Universidad de Sonora); Dr VILLALBA VILLALBA, Ana Gloria (Departamento de Física de la Universidad de Sonora e Investigadora por México (Conahcyt)); Dr MÁRQUEZ BELTRÁN, César (Instituto de Física de la Benemérita Universidad Autónoma de Puebla); Ms FELIX SALAS, Fátima (Universidad de Sonora); Dr PAREDES QUIJADA, Gerardo (Universidad de Sonora)

**Presenter:** Dr MÁRQUEZ BELTRÁN, César (Instituto de Física de la Benemérita Universidad Autónoma de Puebla)

**Session Classification:** CHARACTERIZATION AND METROLOGY

**Track Classification:** Characterization and Metrology