Contribution ID: **211** Type: **Poster**

Optimization of Conditions for Controlling the Size of Iron Nanoparticles through Ultrasonic Cavitation in Water

Ultrasonic cavitation is the process of growth and collapse of vacuum cavities in a liquid when subjected to high-intensity ultrasonic waves. The ability to control the size and distribution of these particles is crucial for various industrial and technological applications, such as catalysis and regenerative medicine.
The objective is to establish a set of conditions that allow for more precise control over the size and structure of the nanoparticles produced, utilizing advanced characterization techniques such as Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM), which enable us to obtain images where the shape, size, and crystallinity of the nanoparticles can be observed.
In this study, operational conditions were investigated to optimize ultrasonic cavitation in the production of iron nanoparticles. The systematically varied parameters included cavitation time (2, 4, and 6 hours) with 10-second breaks every 10 seconds of ultrasonic activity, temperature (20, 30, 40, 70, 80, and 90℃), and ultrasound amplitude (50% and 100%).
The results indicate that it is possible to generate nanoparticles ranging from 3 nm to 500 nm, with changes in morphology and crystallinity. Additionally, spike-shaped nanoparticles with a crystalline composition can be generated, with resultant sizes between 4 and 8 nm.

Keywords

Ultrasonic cavitation, iron nanoparticles, electron microscopy, size control, crystallinity.

Reference

https://www.hielscher.com/es/acoustic-vs-hydrodynamic-cavitation-for-mixing-applications.htm

This work was supported by

This work was supported by PAPIIT- IG101220, M Martinez and J Cruz would like to thank CONACYT (Mexico) for their postdoctoral fellowship

Author approval

I confirm

Author will attend

I confirm

Authors: AGUILAR FABELA, Jorge (Instituto de Investigaciones en Materiales, UNAM); Dr CRUZ CARDENAS, Julio Cesar (Instituto de Investigaciones en Materiales - UNAM); MARTINEZ FUENTES, Marco Antonio (Instituto de Investigaciones en Materiales - UNAM); Dr CALDERÓN OLVERA, Roxana Marisol (Instituto de Investigaciones en Materiales- UNAM); MUHL, Stephen (Instituto de Investigaciones en Materiales - UNAM); Ms VÁZQUEZ DE LA CRUZ, Verónica Cristel (Instituto de Investigaciones en Materiales- UNAM)

Presenter: AGUILAR FABELA, Jorge (Instituto de Investigaciones en Materiales, UNAM)

Session Classification: NANOSTRUCTURES

Track Classification: Nanostructures