Martha Beatriz ALVAREZ-ELIZONDO

Home Country
Mexico

Degree
PhD in Information Technology

Expertise
Optics

Research Focus
Use of Optical Tweezers to Measure Cell Viscoelasticity

Host University
University of Queensland, Australia

Fellowship Awarded
2008

Martha Alvarez-Elizondo was born and raised in Monterrey, Mexico. During her academic career she has been a research assistant, teaching assistant, lecturer and painter as well as an entrepreneur.

While an undergraduate student at the Monterrey Institute of Technology (Monterrey Tech), Martha studied physics engineering, and she obtained her master's degree in electronics systems and optics. She completed her PhD studies in information technology with a focus on biophysics at Monterrey Tech in December 2008 and is conducting research at the University of Queensland Physical Sciences in Brisbane, Australia.

Working with the Queensland Brain Institute at the University of Queensland to learn how physics and biology can be combined to achieve applications in medicine, Martha is using optical tweezers and confocal imaging to study physical changes in cells that undergo exocytosis. Optical tweezers use a focused laser beam to provide an attractive or repulsive force to hold and move microscopic dielectric objects—they are particularly useful in studying a variety of biological systems.

Martha performs experiments using optical tweezers to measure viscoelasticity in the cells and utilizes mathematical models to understand the signals obtained from the movement of vesicles before and after stimulation of exocytosis. Changes in the dynamics of vesicles due to viscosity variation caused by drugs or cellular processes can be an early indicator of disease, since these cytoskeleton changes occur right at the onset. Her work may help in our understanding of the altered neuronal activity associated with learning and memory, along with neurodegenerative diseases such as Parkinson's disease.

Martha plans to pursue post-doctoral research in the United States and then to apply for a teaching position at Monterrey Institute of Technology in Mexico.