School of Chemistry and Materials Science
Seminar Series
Tuesday, November 22 in
GOS-A300
12:30 – 1:30 PM

Identifying the Pigments in Paintings Non-Destructively using Low-Frequency EPR Spectroscopy

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Abstract: Throughout history, paintings have mirrored the changing world and our ideas about it. In turn, artists have provided some of the best records of the development of civilization, sometimes revealing more than the written word 1. Knowing the authenticity of these paintings allows us to trace some aspects of history and civilizations. Because of their value as cultural heritage objects, it is important to conserve their integrity. Using low-frequency electron paramagnetic resonance (LFEPR) spectroscopy of the signal from paramagnetic metal ions to identify pigments, the time when the work was painted can be determined without making any alteration. LFEPR is a magnetic resonance technique, based on the interaction of unpaired electron spins with an external magnetic field 2. The RIT LFEPR spectrometer was built in the laboratory and it detects paramagnetic and ferromagnetic materials in the paint by using a magnetic surface coil probe. Its resolution is limited by its two-centimeter diameter surface coil. The flat surface sample is located inside the main magnet and the surface coil probe will be over it. Once it detects the ferromagnetic or paramagnetic material within a determinate frequency, it will send a signal, as a result, we will get a specific pigment spectrum. The system is controlled by a LabView program interface, which through an amplifier, a lock-in amplifier, a frequency sweeper, a magnet, a surface coil probe, and an oscilloscope can determinate the spectrum of the pigment.

Speaker Bio: Stephany Javier is a first year graduate student in the School of Chemistry and Materials Science. After graduated with a B.E. in Chemical Engineering from Universidad Autonoma de Santo Domingo, Dominican Republic in 2014. She worked as an analytical chemist in different industries before coming to pursue her Masters degree.