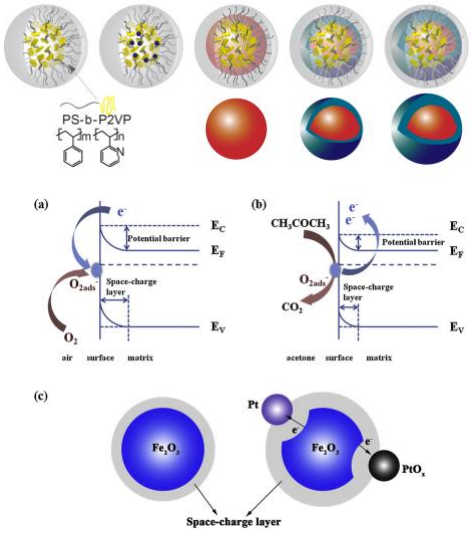
Concordia University
Concordia University
Arts and Science
Department of Physics

TURAK RESEARCH GROUP

MSc and PhD positions (Fall 2023/Winter 2024)
Core-shell nanoparticles for sensing applications
Department of Physics, Concordia University, Montreal Canada
Centre for NanoScience Research (CeNSR)

The Turak Functional Nanomaterials Laboratory seeks to revolutionize sensors by making them cheaper, more accessible, and more flexible. Our research focusses on developing easy, versatile, and inexpensive methods of exploring and tuning surfaces using nanoparticle functionalization. To achieve this vision, the Turak group uses simple manufacturing approaches (reverse micelle deposition), allows nature to dictate morphology (entropic self-assembly, beneficial dewetting), and develops characterization tools that are widely applicable to nanotechnology.



Zhang, Turak et al. Sensors and Actuators B 290 59 (2019)

Gas sensors based on metal-oxide semiconductors (MOSs) have been shown to be desirable to detect trace concentrations detect volatile organic compounds (VOCs), such as methanol, ethanol, acetone, hydrogen sulfide, and toluene. They are preferred over other approaches as the fabricated devices have good stability and convenient operation, within a small volume. Pure metal oxides are rarely reported as a sensing material for specific volatiles because of poor selectivity and response. However, many metal oxides are attractive for material development due to their relative abundance, environmental friendliness, low cost and high stability. Surface modification of metal oxides with precious metals (e.g. Pt, Pd, Au and Ag) has emerged as one of the most important methods for enhancing both the target gas selectivity and gas sensor response.

In the proposed project, the student will develop and test metal-metal oxide core-shell nanoparticles produced using the reverse micelle deposition (RMD) technique to incorporate into sensing gplatforms. RMD is a solution-based approach that allows for cheap and simple incorporation of complex nanoparticles as part of a integrated circuit, electrochemical cell or microfluidic platform. Both the intrinsic properties of the nanoparticles and their effectiveness as a sensor will be assessed.

Concordia Department of Physics is a growing department in a university with rapidly increasing rating. We offer research-based M.Sc. and Ph.D. programs. Our faculty members conduct research in the areas of Condensed Matter Physics (theoretical and experimental), Molecular Biophysics, Medical Physics / Imaging, Photonics, Theoretical High Energy Physics, Computational Physics and Physics Education.

Successful applicants will be offered financial packages consisting of RA, TA and various awards of at least 20,000 CAD per year (often more), for 4 years (Ph.D.) or 2 years (M.Sc.). International students will be offered tuition remissions or other awards to compensate for the international tuition fees.

To apply, please send a letter of interest, CV and contact information for two references in a single pdf document, with email subject **"Turak Lab Project Applicant"**. Only applicants considered for employment will be contacted for an interview. **All applications should be sent to Ayse Turak (ayse.turak@concordia.ca)**