הטכניון - מכון טכנולוגי לישראל

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

הפקולטה להנדסה כימית
ע״ש וולפסון
The Wolfson Department of Chemical Engineering

**Wolfson Department of Chemical Engineering Seminar**

**Wednesday, June 4th, 2025 at 15:00**

**Room 1**

# Photocatalytic Nanoparticles for Electric Treatments in the Body

**Ravit Abel**

**Ph.D. Seminar**

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Traumatic nerve and spinal cord injuries significantly impair basic sensorial and motor functions, requiring neuronal regeneration and axonal growth for recovery. Electric cell stimulation has shown promise in treating nerve injuries by utilizing voltage-sensitive proteins to stimulate cells and promote recovery. However, traditional methods involving invasive electrodes, lacking precision, may damage healthy tissues and cause infections and inflammations.

In this study, we synthesized, characterized, and optimized biocompatible quantum dots (QDs) for minimally invasive, precise, and controlled photoelectrochemical neuronal stimulation and regeneration. Silver sulfide ($Ag_2S$) QDs with unique photocatalytic properties under near-infrared (NIR) light were synthesized and optimized for neuronal stimulation by tailoring their size, doping, and surface chemistry. The QDs demonstrated low toxicity across various cell lines. Under NIR illumination, neurons integrated with these QDs exhibited increased proliferation, axonal outgrowth, neuronal network formation, and enhanced production of associated genes and proteins.

Our findings demonstrate that NIR-activated $Ag_2S$ QDs stimulate and regenerate neurons, an essential step through precise and minimally invasive nerve regeneration to restore lost neuronal activity.

Refreshments will be served at 14:45.