
# OPPORTUNITIES FOR IMAGING AND SENSING IN THE NIR TRANSPARENCY WINDOWS USING FLUORESCENT SINGLE-WALLED CARBON NANOTUBES

Gili Bisker

Department of Biomedical Engineering, Tel Aviv University, Israel

Single-walled carbon nanotubes (SWCNTs) have unique optical and physical properties, and they benefit from the ease of surface functionalization and biocompatibility. Semiconducting SWCNTs fluoresce in the near-infrared (nIR) part of the spectrum, which overlaps with the transparency window of biological samples where absorption, scattering, and autofluorescence are reduced. Further, they do not photobleach or blink. Upon tailored surface functionalization, adsorption of target analytes onto the nanotube corona can result in spectral modulations manifested as either an intensity change or a shift in the peak emission wavelength. Hence, SWCNTs can be used as nIR optical probes for imaging and sensing in biological samples enabling real-time optical detection with both spatial and temporal resolution.

I will present two recent discoveries of protein nanosensors for fibrinogen and insulin using SWCNTs functionalized with variants of poly(ethylene glycol). The recognition also occurs in serum environment, showing that the SWCNTs sensors work in this complex environment despite the potential nonspecific adsorption. These results open new avenues for synthetic recognition of biological macromolecules with optical signal transduction, and hold great promise for medical and clinical applications.

Reference

1. Adi Hendler-Neumark and Gili Bisker, Sensors 19(24), 5403 (2019)
2. Gili Bisker et. al., ACS Sensors, 3(2), 367-377 (2018).
3. Gili Bisker et. al., Nature Communications, 7 (2016).