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Optimizing the Average Distance Between a Blue Light Photosensitizer and a Harmonic Nanoparticle for Effective Infrared Photodynamic Therapy

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Photodynamic therapy can be significantly improved by techniques utilizing light windows of higher tissue penetration depths with optimally matched photoactive agents to provide deep interstitial treatment. Classical blue light photosensitizers were photodynamically activated using infrared light via coupled harmonic nanoparticles with optimized intermediary distances using spacers. Upon 800 nm pulsed laser irradiation perovskite nanoparticles with optimized coupling to either curcumin or protoporphyrin IX reduced the viability of MCF7 breast cancer cells by 73 percent and 64 percent, respectively, while exhibiting negligible dark toxicity. The findings pave the way for clinical adaptation of ease-of-synthesis photodynamically active preparations operable under deep tissue penetrating infrared lights using commonly available otherwise infrared inactive classical blue light photosensitizers.

Biography:

Dr. Refael Minnes has completed a B.Sc. in Biophysics and a PhD in Physics from Bar Ilan University and postdoctoral studies from University of Pennsylvania School of Medicine. He is a faculty at Ariel University Department of Physics and the head of the Bio-electromagnetism Laboratory. In his research he explores the interactions of electromagnetic waves, specifically in the UV-Vis-IR range, with biological tissues and cells.