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Photo-Thermal Ablation of Single Neurons Using Gold Nanostars ZURAB KERESELIDZE, Dept. Physics and Astronomy, UTSA, VICTOR ROMERO, CIO, Mexico, WASKAR EGIDO, Dept. Biology, UTSA; Dept. Physiology, UNAM, Mexico, CHRISTOPHER VALDES, EMMANUEL MICHAELIDES, Dept. Biology, UTSA, XOMALIN PERALTA, MIGUEL JOSE-YACAMAN, Dept. Physics and Astronomy, UTSA, FIDEL SANTAMARIA, Dept. Biology, UTSA —
Nanoparticle mediated photo-thermal ablation therapy is a promising technique for the treatment of multiple illnesses. It has been characterized in bulk tissue, but little is known about its effects at the single-cell level. Photo-thermal ablation works by exciting the surface Plasmon resonance of metal nanoparticles to cause an amplification of the absorption of the incident electromagnetic field, which is transformed into heat through various processes. We have fabricated gold nanostars with a surface plasmon mode in the near infrared via a modified seed-mediated method. Neurons from mouse cerebellar slices internalize the bare nanostars during incubation periods of < 3 hrs. Using a two-photon microscope, we imaged the tissue slices and excited the surface plasmon mode of the nanoparticles. Our results show that we are capable of destroying individual nanostar containing cells without affecting their neighbors. Therefore nanostars can provide a technique for single-cell photo-thermal ablation of neurons with no functionalization.

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