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Gold Nanostars for Photo-Thermal Ablation of Single Neurons[1]
ZURAB KERESELIDZE, Dept. Physics and Astronomy, UTSA, VICTOR ROMERO, CIO, Mexico, WASKAR EGIDO, 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 technique for removing cells within a tissue with minimal collateral damage. It works by exciting the surface plasmon resonance of metallic nanoparticles so there is an amplification of the absorption of the incident electromagnetic field which is then transformed into heat and results in photo-thermal ablation. Little is known about its effects at the single-cell level. We fabricated various sized and shaped gold nanoparticles, including nanostars, with a surface plasmon mode in the near infrared. Neurons of mouse cerebellar slices internalize bare nanostars during incubation periods of <3 hrs. We imaged the slices and excited surface plasmon mode of the nanostars. Our results show that we are capable of destroying individual nanostar containing cells without affecting the neighbors. Other shapes attach to the cell membrane but are not internalized. Therefore nanoparticles can provide a technique for a neuron single-cell photo-thermal without any functionalization.

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