

TWO-PHOTON LUMINESCENCE IMAGING OF CANCER CELLS USING GOLD NANORODS IN A MINIATURIZED PROBE

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ABSTRACT

Two-photon imaging is potentially a powerful technique for the early diagnosis of epithelial cancer because it permits non-invasive imaging at the micron scale hundreds of microns deep into scattering tissue. Though it is possible to discriminate cancerous and healthy tissue based on two-photon imaging from endogenous fluorophores, two-photon contrast agents have the ability to increase signal-to-noise ratio, and can be targeted to molecular signatures of interest that may not be fluorescent. In this talk, I will present our investigations on gold nanorods as contrast agents for two-photon luminescence (TPL) imaging. We found that we can achieve a

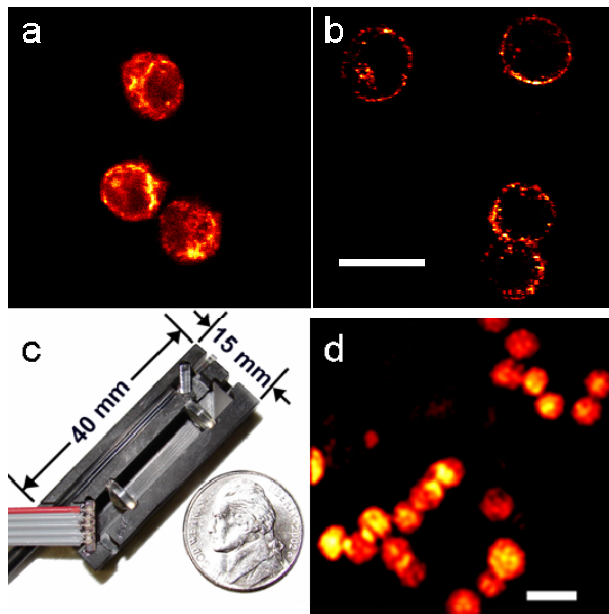


Figure 1: (a) TPAF image of unlabeled cells using 9 mW excitation powers at 760 nm. (b) TPL image of gold nanorod labeled cells using 0.14 mW of power at 760 nm. (c) Miniaturized two-photon probe. (d) TPL image of cancer cells using the probe. Scale bars are 20 μ m.

three orders of magnitude increase in signal using gold nanorods in comparison to two-photon autofluorescence (TPAF) imaging (Fig. 1a,b)[1]. Excitation with ultrashort laser pulses at the plasmon resonance of nanorods allows for efficient absorption of two sequential NIR photons and emission of bright two-photon luminescence. Because imaging of intrinsic fluorophores is often difficult with miniaturized devices due to their relatively weak signals, the use of such a bright contrast agent holds the promise to enable in-vivo applications of two photon imaging in a clinical setting. We have recently developed a small probe capable of both two-photon imaging and femtosecond laser microsurgery (Fig. 1c) [2]. Bright signal from TPL allows for the imaging of cancer cells using the miniaturized system (Fig. 1d) while the limited power that can be delivered through the probe impairs the ability to image weak endogenous fluorophores.

REFERENCES

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