

LIFE CELL MEMBRANE IMAGING USING SURFACE PLASMON-MEDIATED FLUORESCENCE MICROSCOPY

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Surface Plasmon-Mediated Fluorescence Microscopy (SPMFM) is a new imaging technique which takes the advantage of surface plasmon (SP) properties of a metallic thin film to selectively excite and detect fluorophores in a restricted specimen region immediately adjacent to the metallic/sample interface [1,2]. This technique is particularly suitable for cell membrane imaging. SP mediated excitation and emission provide many advantages over other competing techniques. When compared to standard TIRF microscopy, the molecular detection efficiency is enhanced and the confinement is increased. Besides, the additional distance dependant emission filter resulting from the near-field coupling of the fluorophore emission to the SP, provides an enhanced signal to noise ratio. In cell imaging, it limits the background noise resulting from the scattering effect of the excitation light by the sample.

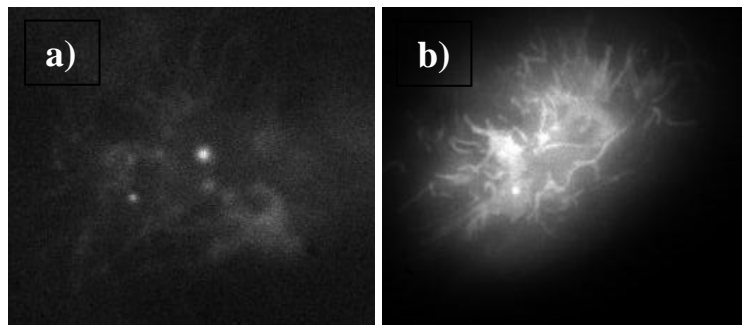


Figure 1: HEK cells transfected with mCherry on silver thinfilm observed at a subcritical excitation angle (a) and at the surface plasmon excitation (b).

We will show how SPMFM can enhance the sensitivity of TIRFM applications (such as the observation of endo- and exocytosis, protein dynamics, cell-substrate interactions and signaling events). As an example, Figure 1 shows images of live Human Embryonic Kidney (HEK) cells transfected with mCherry (excitation at 530 nm; emission 580 nm). The images compare silvercoated glass using epi-fluorescence imaging at a subcritical incident angle (a) and at the surface plasmon excitation angle (b). Images are taken under identical experimental conditions and no brightness or contrast correction is applied.

[1] W. L. Barnes, A. Dereux, and T. W. Ebbesen, *Nature* **424**, 824–830 (2003).

[2] R.-Y. He *et al.* “Enhanced live cell membrane imaging using surface plasmon-enhanced total internal reflection fluorescence microscopy” *Opt. Express* **14**, 9307–9316 (2006).