SURFACE PLASMON MICROSCOPY OF LIVING CELLS USING PARTIALLY INCOHERENT LASER BEAM

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Surface plasmon microscopy has been proven as a highly sensitive tool to investigate the distribution of the refractive index in the sub-micron vicinity of a plasmonic metal film. We have utilized this feature to specialize our surface plasmon microscope in measuring the intracellular refractive index [1] and cell–substrate distance in a label-free manner [2] and in comparison with electron microscopy [3].

On the other hand, it has been shown that using a rotating ground glass, one can reduce the spatial coherence of the laser beam, while maintaining the collimation [4]. We have implemented this technique in our revised surface plasmon microscope to eliminate the typical speckle noise in the laser illuminated imaging systems and meanwhile achieve both the lens-imaging and scanning localized modes which require a collimated beam.

Using our microscope, we have studied cultured neurons on high-index glass, coated with metal or metal–silica films, to investigate the cell–substrate distance and intracellular refractive index as functions of position and time.

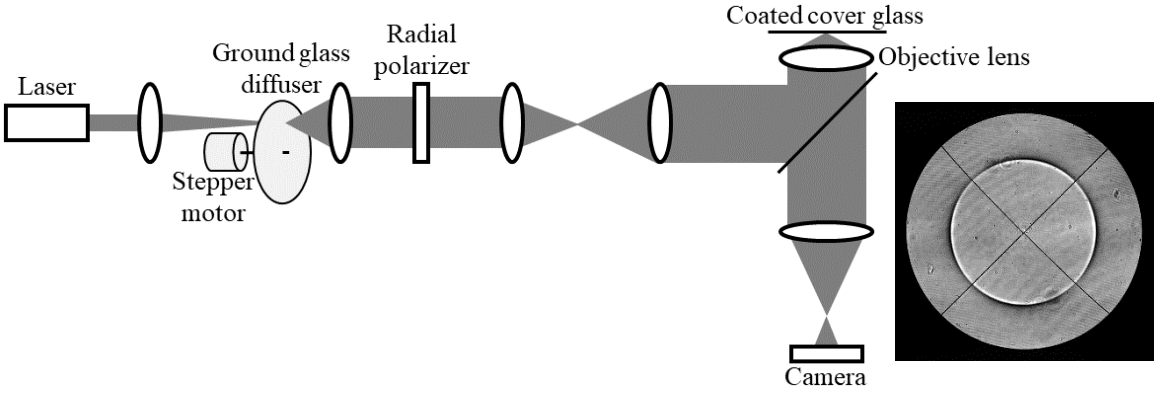

Figure 1: The design of the optical system and a typical BFP image of gold-coated glass

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