ENHANCED SURFACE PLASMON MICROSCOPY RESOLUTION BASED ON LIGHT SWITCHING IN TWO DIRECTIONS

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Surface plasmon microscopy (SPM) takes advantage of surface plasmon (SP) occurring at the interface between metal and dielectric and enables label-free imaging [1]. The propagation length of SP on the order of a few microns gives rise to the V-shaped interference pattern by scattering, which is well-known to limit the resolution of SPM. To address this issue, we constructed spatially switched SPM (ssSPM) that can switch incident wave vectors without changing polarization [2]. Channel switching was implemented by mechanical control of optical elements. Two-channel ssSPM was applied to imaging nanoscale patterns and biological objects such as cells. Minimum filtering algorithm was used for image reconstruction, nanowires (w = 0.15μm, 0.55 μm, 1.1 μm and 7.8 μm) and A549 cell images obtained from ssSPM were found to have most of blur removed with edges improved over conventional SPM. We have also confirmed that the propagation length of ssSPM as an indicator of image resolution was reduced by 15 times smaller than that of conventional SPM. The resolution was determined to be almost equal to that of bright field microscopy. The concept was extended to multi-channel ssSPM with eight channels for imaging more general objects. The improved performance was also confirmed by imaging neuronal cells.

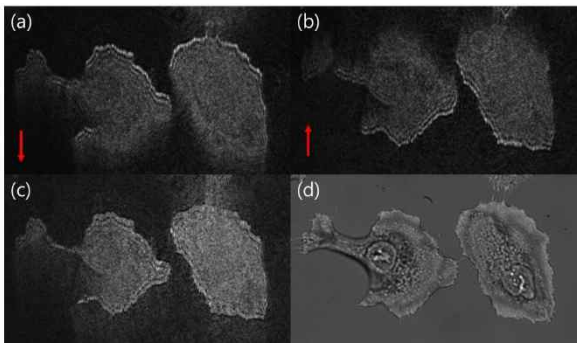

Figure 1: 2-channel ssSPM image of A549

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