FABRICATION OF HIGH THROUGHPUT NSOM PROBE USING REFLOW PROCESS OF BIMETALLIC LAYER

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There have been tremendous interests about the nearfield optical trapping and nearfield optical spectroscopy. Though, the weak nearfield intensity has been major obstacle for its application. The nearfield optical intensity through the nanosize aperture is dependent upon the aperture size, the grain size of the deposited metallic film, and other factors influencing the surface plasmon excitation. The surface plasmon excitation can be accomplished with periodic texturing of the metal surface around the nanoszie aperture[1]. The enhancement of the nearfield optical intensity can be utilized for the nearfield optical trapping or lithography, etc [2,3].

In this report, the two adjacent metal aperture was fabricated using microfabrication technique including stress-dependent oxidation, isotropic wet etching of silicon oxide and bulk etching of Si, and bimetallic metal deposition.(Fig.1) The adjacent nanosize metal aperture with distance less than the input wavelength can improve the output optical intensity. The bimetallic deposition of Ti/Al layer has been performed in order to provide better uniformity of the coated metal film. The buffer layer of Ti thin film would reduce grain size during the reflow process of the deposited Al thin film. The reduced grain size of the deposited thin film is supposed to help the throughput of nearfield optical intensity. The optical characterization of the fabricated nearfield probe will be carried out with commercial NSOM. In addition, the trapping capability of the biological molecule will be tested.

References:

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Figures:

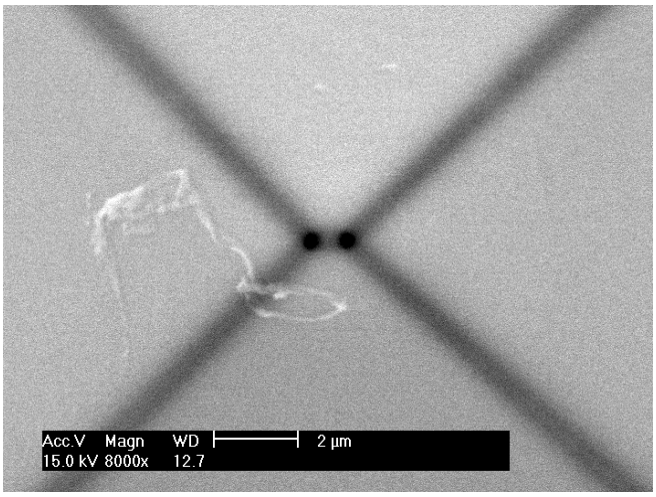

Fig.1. The two adjacent nanosize oxide aperture were fabricated in order to examine the possible light throughput intensity with proper bimetallic metal depostion and reflow process. This NSOM probe design will be tested for biological molecule trapping.