Supporting information

Yu Gong, Alan G. Joly, Patrick Z. El-Khoury and Wayne P. Hess*

Physical Sciences Division, Pacific Northwest National Laboratory,

P.O. Box 999, Richland, Washington 99352, USA

*wayne.hess@pnnl.gov

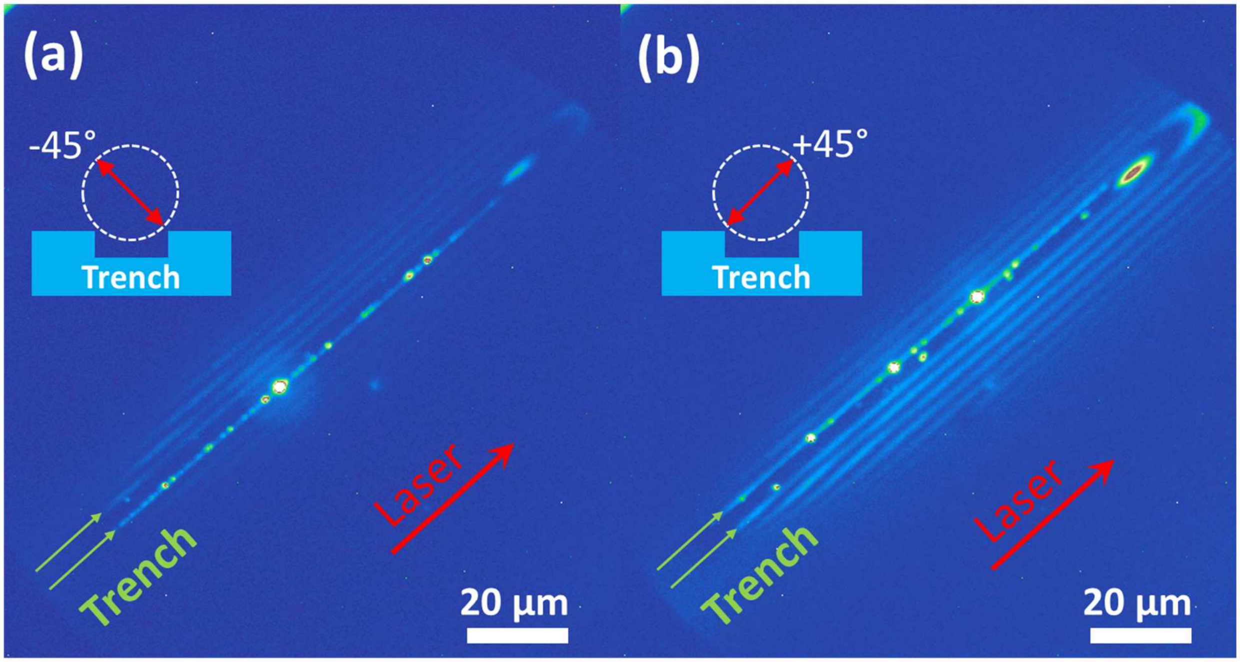

Figure S1. PEEM image of a plasmonic trench and interference fringes following illumination from pump beam with (a) -45°and (b) +45° polarization. The pump polarization for left images is rotated 45° counter-clockwise compared to P polarization, and defined as -45°.

Figure S1 shows PEEM image of plasmonic trench under pump beam illumination with -45°and +45° polarizations. The asymmetry of interference fringes at left and right side of the trench indicates a non-symmetric PSP launching controlled by pump laser polarization. In addition, it also shows when the PSP launching is stronger at the left side of trench; the localized field enhancement at the right side of trench edge is stronger and *vice versa*.

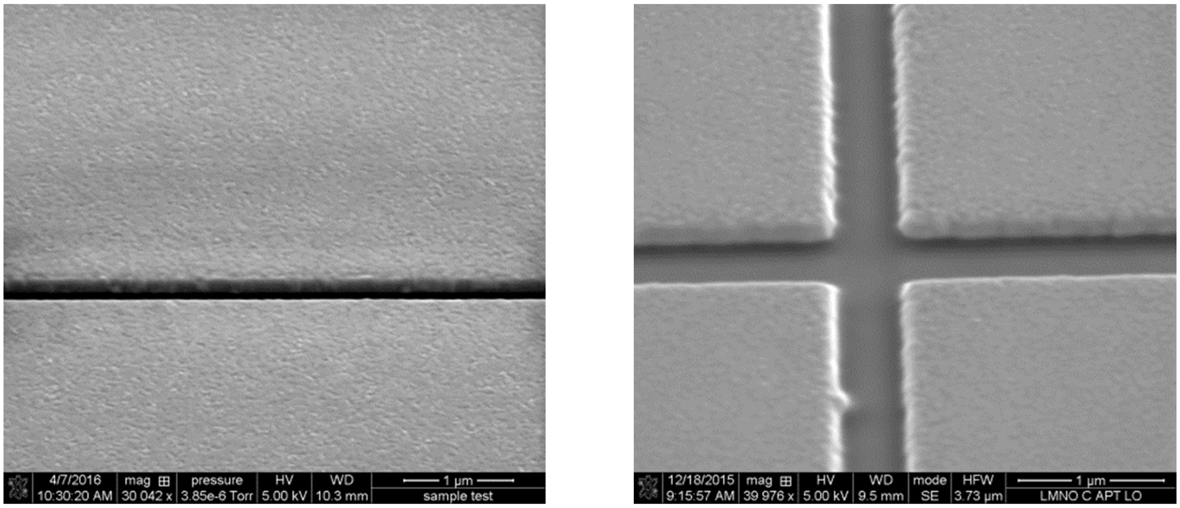

Figure S2. High-resolution SEM images of FIB-milled trenches in a 100 nm silver film. Deposition results in a polycrystalline film as evidenced by the grain boundaries. Also apparent is the rounded edges generated by the FIB milling process.

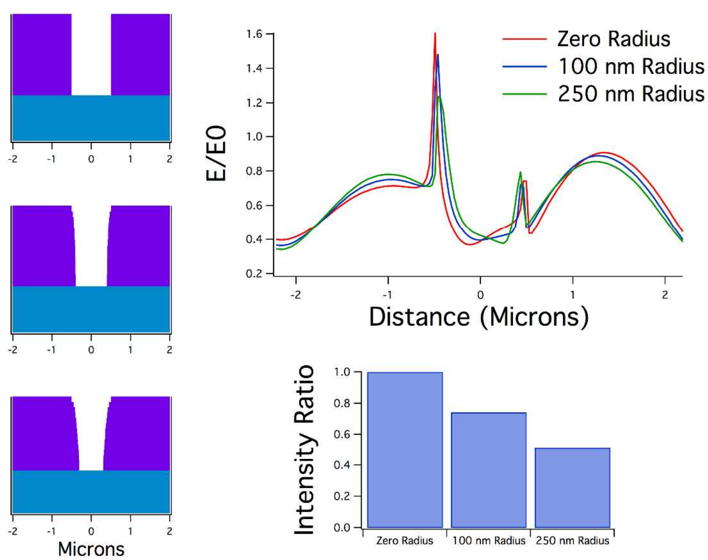

Figure S3. FDTD calculations performed on three different trench architectures with (upper left) no edge rounding, (middle left) 100 nm radius, and (lower left) 250 nm radius. In all cases the width at the top of the trench is 1 micron and purple designates the silver film and blue designates the underlying dielectric substrate. The graph in the upper right displays the changes in E/E0 for each case. The normalized intensity ratio displayed in the lower right is obtained by taking the sixth power of E/E0 as determined by the three-photon PEEM power dependence. The results indicate that rounding the corners can significantly decrease the asymmetry ratio.