Supplementary Online Material (SOM)

Maskless Plasmonic Lithography at 22 nm Resolution

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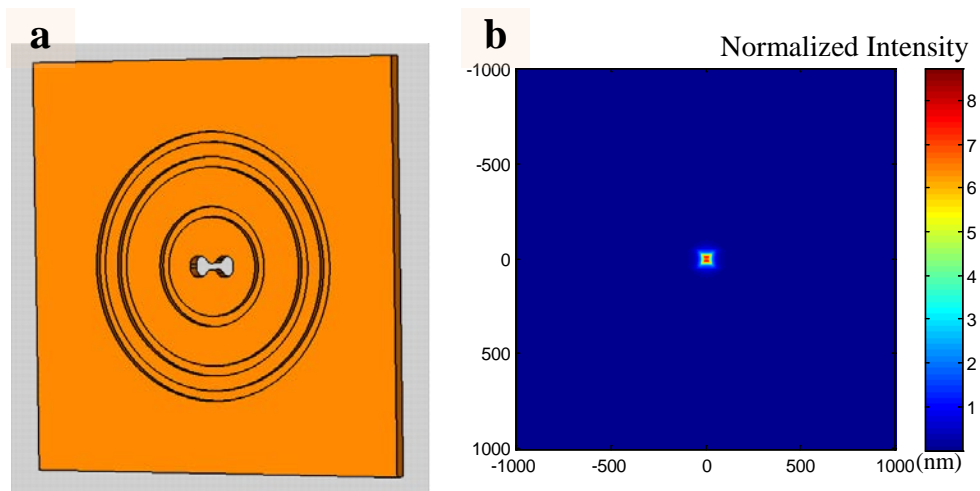
Figure S1

Figure S1 | The contrast of the MPL focus can be enhanced by replacing the etched-through rings with shallow blind grooves from the incident side, showing (a) the perspective view of the MPL with shallow blind grooves, and (b) the side lope transmissions have be attenuated by more than one order of magnitude and the contrast ratio is enhanced to 70 comparing with that of Figure S1.
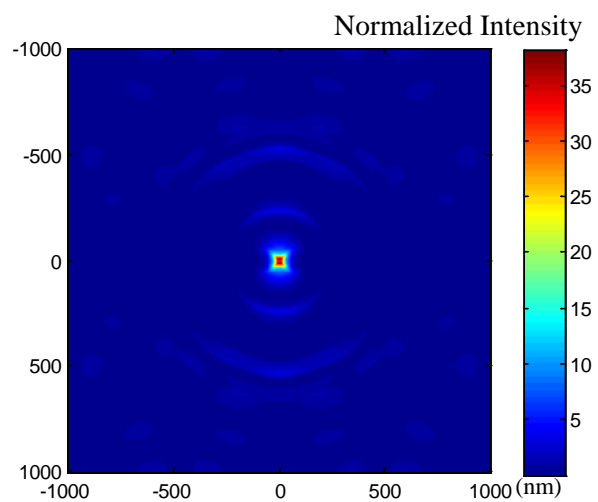
Figure S2

Figure S2 | When replacing Cr with Al, the focus spot intensity can be further improved by a few times higher than that of Figure 2c in the paper.
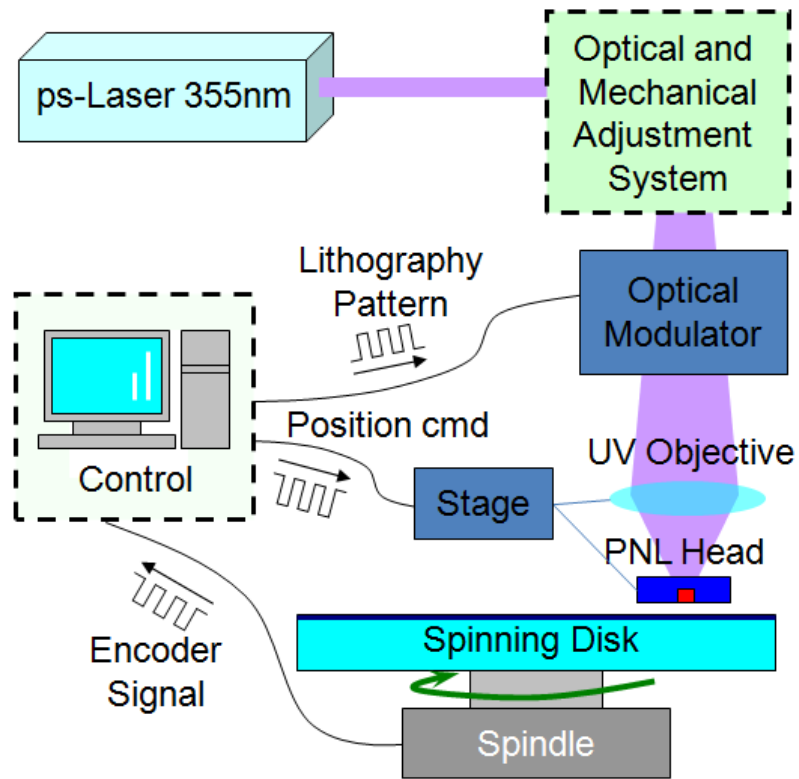
Figure S3 | Plasmonic nanolithography (PNL) experiments layout. A control system is used during patterning process to modulate the incident beam based on the relative position between the PNL head and the spinning substrate.
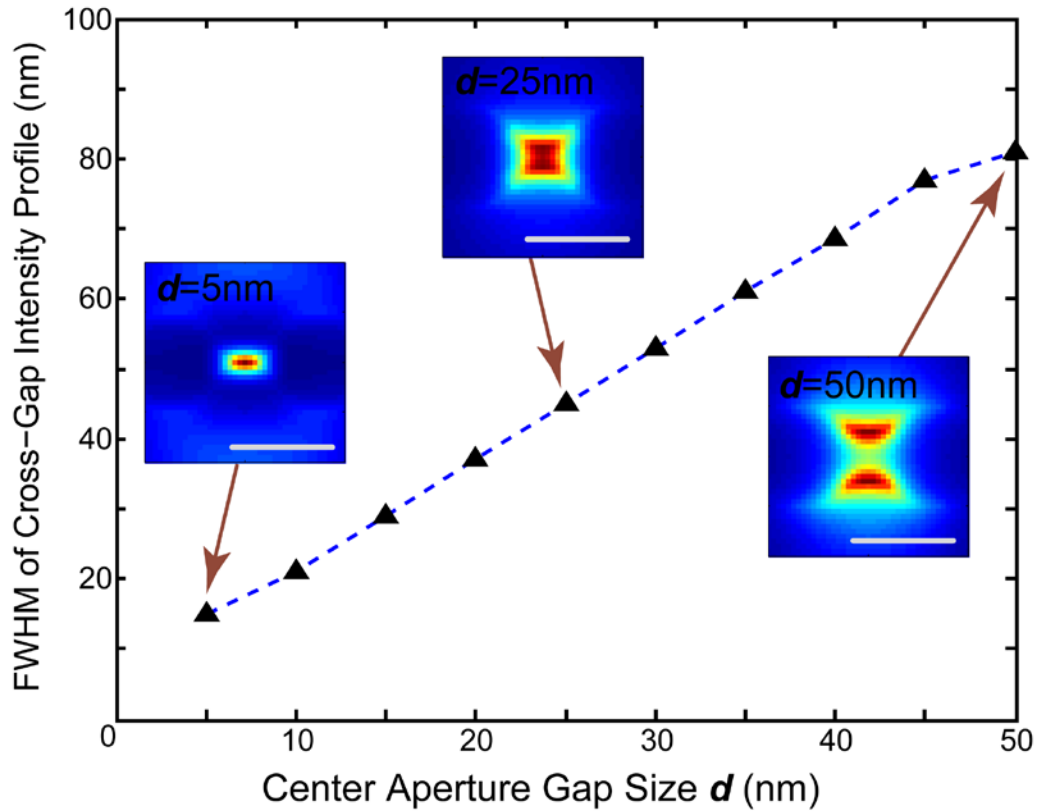
Figure S4

Figure S4 | MPL's field confinement is a function of the gap size of the center aperture (gap size *d* in the insert of Fig. 2a). The FWHM of the intensity profile almost linearly increases from 15 nm to 81 nm at the gap range of from 5 nm to 50 nm. As the gap further increases beyond 50 nm, the focal spot eventually splits into two separate focal spots. Therefore, a reasonably smaller gap size is preferable for generating finer feature. All scale bars are 100 nm.