Supporting Information for

Lithographically Patterned Electrodeposition of Gold, Silver and Nickel Nanoring Arrays with Widely Tunable Near Infrared Plasmonic Resonances

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1. Nanoring height measurements by AFM. Nanorings were imaged by AFM to determine the height of the unconfined electrodeposition process. The height determined from AFM was compared with the nanowire width determined from SEM measurements. From this comparison, the height was approximately 65% of that nanowire width. Figure S1a shows a typical AFM measurement of an array of silver nanorings. A line profile in Figure S1b of nine nanorings shows a mean height of 99 nm. The SEM analysis of this sample found the width to be 150 nm.

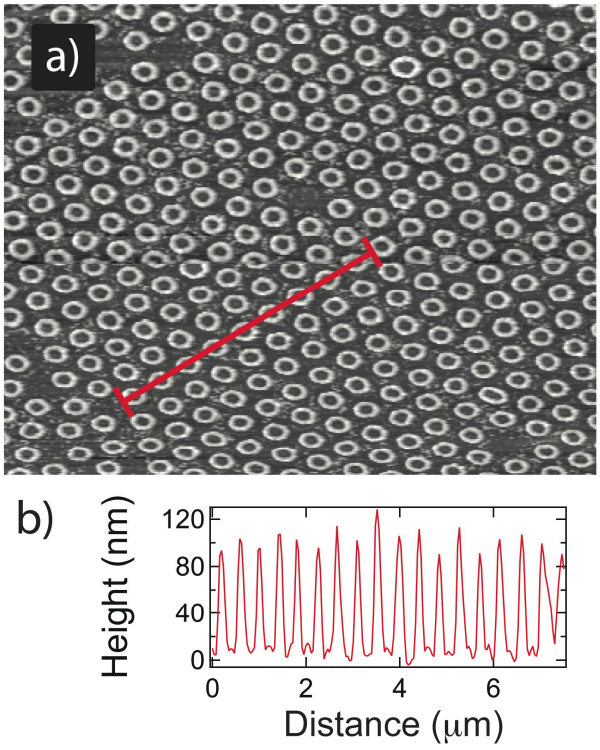

Figure S1. (a) AFM image of gold nanorings. (b) Line profile of nanorings with average height = 99 ± 7 nm.

2. Nanoring dimensions by image analysis. To characterize the dimensions of the nanorings, we found the inner and outer radii using image processing edge analysis. Each nanoring was analyzed individually; Figure S2a shows the SEM of an exemplary nanoring. The convolution of an edge filter (Sobel) with the original image, squared and summed in the horizontal and vertical direction, followed by a threshold, to create a binary edge map is shown in Figure S2b. The white edge pixels are given an XY coordinate, and these coordinates are averaged to find the center of the ring. A distribution is created of the center-to-edge distance for each edge pixel as shown in Fig S2c. The distribution shows two clear peaks that are fit to Gaussians to find the mean inner and outer radii of the ring. The width value is taken as the difference between these two values. To visually confirm a good fit, the center point, inner and outer radii are displayed in red in Fig S2d. The value in pixels was converted to nanometers for comparison.

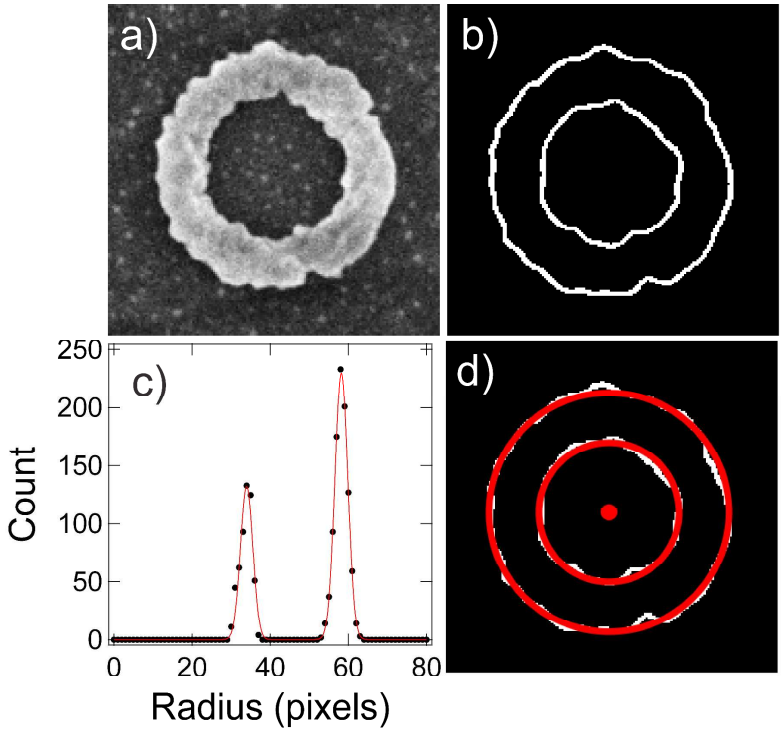

Figure S2. SEM image analysis. The original SEM image (a) is transformed into (b) using a binary edge map.(c) Gaussian fits of the distribution of center-edge distances for the inner out outer radius. (d) Overlay in red of the center point, and resulting inner and outer radii.