Plasmonic elements on curved surfaces

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Spatially periodic arrays of photonic scatterers are the basis for several important technologies such as gratings and phased arrays. The total response of a system the array possesses features from both the individual scatterers as well as the spatial arrangement of the elements. Typically, the spatial distribution of the elements includes design parameters such as pitch spacing and array layout, but typically in a plain. Recent work in meta-surface optics has indicated there may be advantages to placing the meta-surface on a curved rather than planar substrate. Most optical lithography methods possess a finite depth of focus which scales with the target resolution. Here we use interferometric lithography to create arrays of plasmonic scatterers on a curved surface (Fig. 1) and study the spectral properties of the transmitted light. We identify the spectral features of the individual plasmonic scatterers and the relationship between their isolated spectral response and the influence of their spatial arrangement on the total response.

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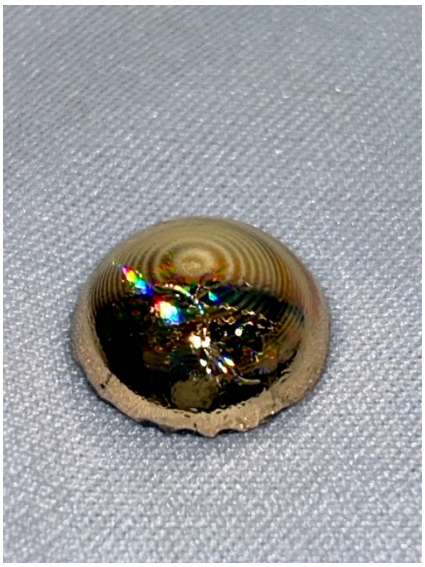

Figure 1: Plasmonic elements on a curved glass surface: A.) Interference pattern from two mutually coherent plane waves; B.) Interference pattern exists in the entire 3D volume of plane wave overlap - allowing us to pattern macroscopically curved surfaces.