

# Wafer Scale Fabrication of High-Aspect Ratio Gold Nanostructures using $\text{Ar}^+$ - Ion Beam Etching

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Ion beam etching is a widely used technique to define structures particularly in materials such as noble metals where the lack of an oxidative state prevents them from being etched in a typical RIE process. Chief among the noble metals, gold has widely been used in a wide range of structures and devices. The ability therefore to fabricate high aspect ratio gold nanostructures is an important process in the fabrication of nanostructures and its use in areas such nanofluidics, nanocalorimetry, and nanoplasmonics have all been well documented. In this paper, we report on the process development of forming high aspect ratio features ( $\text{AR} > 10$ ) in gold using a broad beam  $\text{Ar}^+$  - ion source as the preferred method of fabricating nanostructures particularly over large areas such as 150 mm diameter substrates. We show some recent results we have completed in the area of nano-hole and nano-grating fabrication and discuss the techniques used to control sidewall slope while maintaining size uniformity over wafer-scale areas.