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Sandia National Laboratories

FABRICATION OF HIGH ASPECT RATIO METALLIC PILLAR ARRAYS

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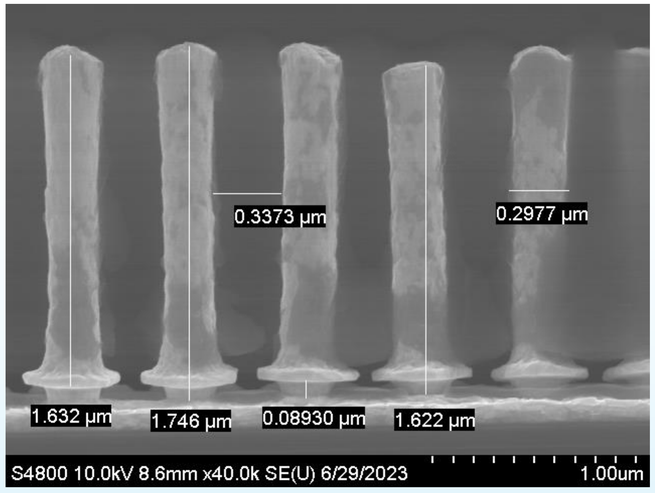
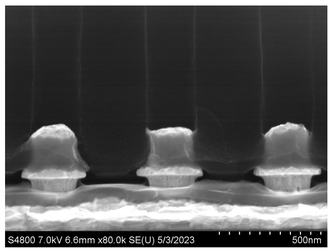
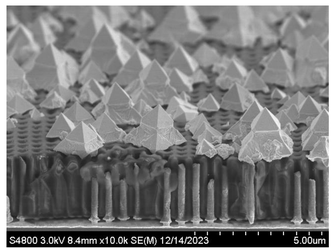
Future work will focus on eliminating the plated skirts that form between the ARC layer and the photoresist and removing the seed layer post PR strip. The equipment and materials used for fabrication are as follows:

- Metal evaporator
- i-CON7, NR7-1500P
- Interferometric lithography setup (355nm laser)
- Reactive ion etcher
- Neutronex 309 Au sulfate plating solution
- Pulsed power supply
- Tergitol wetting treatment
- Plasma asher



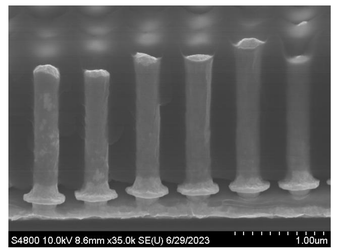


9.5mA for 0.04 A-m

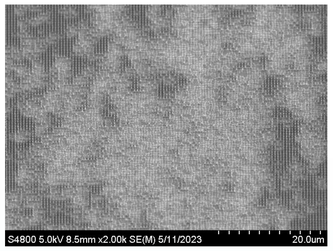


25mA for 0.10 A-m

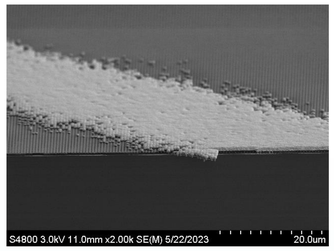
The small diameter of the pillars makes them very sensitive to high current and results in uneven plating. Lower current, higher plating times result in more even and reproducible pillar heights.



1.9 mA for 0.10 A-m

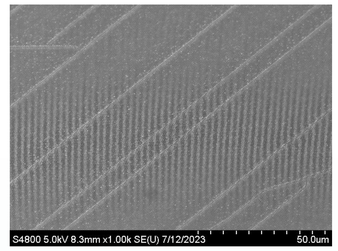


Varied Plating Area

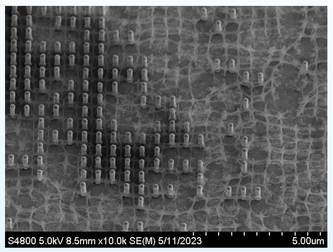


Streaks in Photoresist

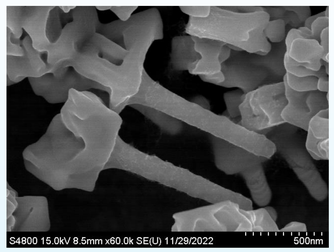
Previous samples varied in size and had uneven lithography, resulting in poor uniformity. Keeping sample sizes consistent and utilizing exposure masks has dramatically improved uniformity across the entire plating area.



Streamlined Lithography

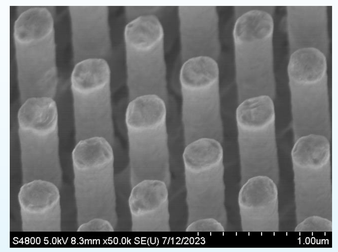


Uncontrolled Asher



Solvent PR Strip

Clearing the photoresist post plating using solvents detaches the pillars from the substrate. Non-temperature controlled ashing results in defects in the substrate. Extended, temperature controlled ashing yields the best results.



Controlled Asher

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