



## Inventors

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# Dissolvable Metal Supports in 3D Printed Metals and Oxides

AzTE Case # M16-103P

## Background

Even though additive manufacturing and 3D printing have existed for more than two decades, there are still opportunities for improvement. Dissolvable supports are common in 3D plastic printing and dramatically simplify the cleanup process. However, the use of dissolvable supports has not been extended to 3D metal printing. Traditionally in 3D metal printing, the supports are made from the same material as the part, and subsequent machining operations are needed to remove the supports. These machining operations add significant cost and impose design restrictions on the part. This limits the type of shapes that can be fabricated and may require additional features on the part/support so that the part can be securely held while supports are being machined off. Overall, the current process is too expensive and complex to be effective for 3D metal printing. Therefore, there is a need to create a support removal process for 3D metal printing that is simple and cost effective.

## Invention Description

Researchers at Arizona State University have developed a set of methods and chemistries for the easy removal of supports or sections of 3D printed metal structures. This is accomplished by incorporating chemically or electrochemically dissolvable elements into the metal support structures. The approach is to print metal structures using patterning, whereby a second metal is used in certain areas. The second metal can be preferentially removed by a chemical or electrochemical method to allow a free standing metal structure in a first metal. This new process dramatically simplifies the support removal process for metal 3D printing. Additionally, this allows for new design freedoms as supports can be removed by fluids instead of machines.

## Intellectual Property

### Status:

*Pending*

## Potential Applications

- Metal 3D printing
- Additive and subtractive manufacturing
- Rapid prototyping

## Contact

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## Benefits and Advantages

- **Versatile** – Fluid support removal allows for more efficient support removal and increases design freedom.
- **Lower Costs** – Simple technique that does not require elaborate machinery to remove support structures.
- **Wide Range of Application** – This technique covers a broad range of metals as both the “part” material and the “sacrificial” support material.