



# Multiple-Patterning Nanosphere Lithography

Tech ID: 29498 / UC Case 2018-446-0

## SUMMARY

Researchers led by Paul Weiss from the Department of Chemistry and Biochemistry at UCLA have developed a novel technique that solves the scalability issue in the fabrication of three-dimensional nanostructures.

## BACKGROUND

Configurable three-dimensional nanostructures have a wide range of applications spanning electronics, biotechnology, and optics due to favorable optical, electrical, mechanical properties as well as biocompatibility. However, issues of scalability and configurability prevent mass adoption of this technology. Current fabrication of nanostructures uses lithographic techniques using lasers and nanospheres. Lithographic techniques that use lasers, like electron-beam lithography, have higher costs, more complexity, and lower throughput than nanosphere lithography. Nanosphere lithography uses a layer of patterned nanospheres that act as a mask so that the surrounding material can be etched away forming 3D structures. However, this technique is limited in that each layer of nanospheres can only be used once, limiting the types of shapes that can be made. Multiple uses of this nanosphere layer would allow for the fabrication of structures that are more complex and desirable.

## INNOVATION

Researchers led by Paul Weiss from the Department of Chemistry and Biochemistry at UCLA have developed a novel technique that solves the scalability issue in the fabrication of three-dimensional nanostructures. This work builds upon nanosphere lithography to allow for multiple uses of the nanosphere layer to create a variety of three dimensional structures. This allows the user to create and specify structures with different inner/outer diameters, heights/hole depths, and pitches. These new capabilities allow for the creation of variable and unique nanostructures while still enjoying the benefits of nanosphere lithography including high throughput and low cost.

## APPLICATIONS

- ▶ Electronics (solar cells, sensors)
- ▶ Biotechnology (biosensors, biomaterials, drug delivery, gene editing)
- ▶ Optics

## ADVANTAGES

- ▶ Cheap
- ▶ High throughput
- ▶ Tunable
- ▶ Simple

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,037,794	06/15/2021	2018-446

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Determining Oil Well Connectivity Using Nanoparticles](#)

## CONTACT

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## INVENTORS

- ▶ Weiss, Paul S.

## OTHER INFORMATION

### KEYWORDS

nanomaterials, nanosphere, silicon,  
  
fabrication, lithography,  
  
nanostructures, patterning

### CATEGORIZED AS

- ▶ **Materials & Chemicals**
  - ▶ Nanomaterials
- ▶ **Nanotechnology**
  - ▶ Electronics
  - ▶ Materials
  - ▶ Other
- ▶ **Semiconductors**
  - ▶ Design and Fabrication
- ▶ **Engineering**
  - ▶ Other

### RELATED CASES

2018-446-0

- ▶ [High-Throughput Intracellular Delivery of Biomolecular Cargos via Vibrational Cell Deformability within Microchannels](#)
- ▶ [Scalable Lipid Bilayer Microfluidics for High-Throughput Gene Editing](#)
- ▶ [Guided Magnetic Nanospears For Targeted And High-Throughput Intracellular Delivery](#)
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