Methods of Fabricating Nanoscale-to-Microscale Structures (#3574)

Method for converting micro-templates into strategically shaped micro-particles

Georgia Tech inventors have developed a method for producing 3D shaped nanoscale-to-microscale structures from a nanoscale-to-microscale template. The template may be prepared in a variety of ways, including assembly by a natural or genetically-modified biological organism. The produced 3D structure maintains the same shape as the template while having a different chemical composition, comprising of an element and a metallic alloy or non-oxide compound. This technology provides a means of producing free-standing nanostructured micro-assemblies of silicon based compounds for use in electronic, optical, chemical, or mechanical applications. Using this method, large numbers of precisely-shaped 3D biologically-replicable micro-templates can be converted into low-cost nanostructured micro-assemblies (shaped micro-particles) comprised of functional silicon compounds.

Benefits/Advantages

- **Low-cost** – low-cost production of precisely-shaped 3D biologically-replicable micro-templates that can be converted into nanostructured micro-assemblies
- **Scalable** – Capable of assembling 3D nanostructures on a massive scale
- **Tunable** – Chemicals can be tailored to form elemental, metallic alloy, or compound chemistries
- **Precise** – Reproducible assembly of identical 3D nanostructures

Potential Commercial Applications

- High-energy-density, silicon anodes for lithium ion batteries
- Fuel cells
- Communications and computing
- Optical displays and lighting
- Biomedical applications
- Aerospace
- Automotive
- Energy production
- Drug-delivery

Background/Context for This Invention

Research and development is underway to develop methods for assembling microscale-to-nanoscale

devices with complex shapes for use in the biomedical, computing, environmental, and other various industries. Microscale devices are used as sensors in the automotive and medical industry; however, there is untapped potential for the use of 3D microscale-to-nanoscale devices. There is a need to develop methods that can be scaled for mass production as well as preserve the structural features on a small scale.

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More Information

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Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/methods-fabricating-nanoscale-microscale-structures

Images: