OAK RIDGE NATIONAL LABORATORY
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Scalable Fabrication of Ordered 3D Nanofences for Diverse Applications such as Next Generation Batteries

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Technology Summary

While fabrication of a variety of interesting nanostructures has been demonstrated in small samples, a predominant number of the methods for making such nanostructures are not readily scalable or completely reproducible. In many cases, for example, deposits in a furnace downstream trap have to be scraped and nanostructures harvested therefrom. Therefore, such nanostructures are prohibitively expensive and the utility thereof cannot be realized. Reproducible and controlled fabrication of nanostructures is needed for many novel electronic and electromagnetic devices such as those involving semiconductors and superconductors.

ID-2243 discloses an article includes a substrate having a surface, and a nanofence supported by the surface. The nanofence includes a multiplicity of primary nanorods and branch nanorods. The primary nanorods are attached to the substrate and the branch nanorods are attached to at least one other of the primary nanorods and the branch nanorods. The primary nanorods and the branch nanorods are arranged in a three-dimensional, interconnected, interpenetrating, grid-like network defining interstices within the nanofence.

The present invention is a modification thereof wherein arrays of ordered, regularly placed, 3D nanofences of metals/alloys are formed by a scalable method. The ID nanofences are single-crystal-like when formed on a biaxially-textured substrate. The invention is applicable to making materials such as Cu for battery electrodes or for solar cell collectors.

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