Biocompatible Nanowire Scaffolds

A variable process has been discovered for forming a plurality of nanowires on a variety of metallic substrates. The nanofibers generally form 3D scaffolds having interconnected macropores. By varying the process parameters, such as reaction temperature, reactant concentration, and reaction time, the length and diameter of the nanowires may be controlled and concomitantly, the average diameter of the macropores may also be controlled.

In an exemplary embodiment of this invention the metallic substrate is titanium (Refs: *Nanomedicine: Nanotechnology, Biology, and Medicine 2 (2006) 248 – 252* and *Chem. Mater. 2007, 19, 4454 - 4459*). Yet, both the metallic substrate and the material comprising the nanofibers of the invention can be varied, depending upon the novel products and/or uses desired to be produced.

Current bioscience research has revealed that this process fabricates robust multifunctional bioscaffolds that are self-assembled from ceramic nanowires, and directly coat various materials. Researchers have tailored a metal oxidation route to large-scale solution fabrications of ceramic nanowires and nanotubes that root, at low temperature, via a solid-state "bottom-down" growth mechanism, on various metallic substrates of any size and shape. The tips of the nanowires and nanotubes at the same time in solution "top-down" grow atop and then self assemble into a macroporous scaffold as a robust coating on the metal. Because the nanowire scaffolds are both durable and macroporous, they are useful for a wide variety of both biomedical and dental applications.

The Patent Rights will include novel, biocompatible nanowire scaffolds that form the substrate on or from which a variety of biological materials are able to attach, grow and/or be delivered, e.g., human or animal **mesenchymal stem cells** that form the basis for a variety of **orthopedic, vascular** and **dental applications** supporting the following uses: orthopedic and dental implant applications; and cell, tissue and joint engineering and growth (such as cell adhesion, proliferation, and differentiation); and protein cell growth promoters; and controlled on-site drug release; and cardiac or peripheral stents or valves; and photocatalytic sterilization properties that could be useful in both hospital and food-processing environments, etc..

The technology is patent pending and is available for license .

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