Self standing nanoparticle networks/scaffolds with applications in drug delivery, tissue engineering, catalysis etc.

EXECUTIVE SUMMARY

A novel process of preparing self standing nano particle networks with adjustable mesh size, prepared from various materials and having a wide variety of applications. The pore size ranges from nano to micro porous (500nm to 1mm) and is very precisely controllable

BACKGROUND

In nanoparticle scaffolds, no existing process can cross link the nanoparticles such that the porous scaffolds made are self standing and the process is easy to implement. The scaffolds hence derived have a wide range of applications.

TECHNOLOGY DESCRIPTION

A novel process of preparing self standing, crosslinked networks (scaffolds) of nanoparticles from commonly available materials as metallic, inorganic, semi conducting and magnetic particles, organic and polymeric compounds. The scaffolds have controllable mesh size and pore size can range from nano to micro porous. The particle volume fraction is between 0.5 to 50%

MARKET POTENTIAL

- The market for nanomaterials in the US alone was estimated to be around $1.4 billion in 2008[1]
- The demand for nanomaterials is projected to grow at an impressive 21% per year till 2013[2] indicating a significant market potential
- The global market for drug delivery has been projected to exceed $57 billion by 2012[3]

1,2 http://www.freedoniagroup.com/
3 www.biomedtrends.com/GetDetails.asp?CatName=Bio%20Lab

VALUE/ADVANTAGES

- Generic production procedure
- Can be formed in to ordered, structured phase, lamellar, spongy, cubic- preferably hexagonal network
- Has a precisely controllable directionality and pore size can range from 500 nm to 1 mm

APPLICATIONS

- Drug delivery- Inorganic/organic delivery scaffolds for Nitric Oxide- an important bioregulatory agent
- Tissue engineering- Cell seeding scaffolds
- ➢ Proposed applications of scaffolds
- Cell growth substrate
- Materials for solar cells
- Electrical/thermal insulators
- Catalysis- Catalyst support for small sizes available for diffusion of reactant molecules
- Metamaterials*- Electromagnetic devices- ideally gold nano particles
- Electronic devices
- Chromatography

TECHNOLOGY STATUS/LINKS

- Demonstrated at the lab scale
- On the lookout for potential partners for licensing
- Patent application filed: WO #- WO2010070679, Indian #- 2828/DEL/2008
- Kamendra, P. et *al.* (2011) Self-Standing Three-Dimensional Networks of Nanoparticles With Controllable Morphology by Dynamic Templating of Surfactant Hexagonal Domains, *Chem. Mater.*, 23 (6), 1448–1455 (link)

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