SELF STANDING NANOPARTICLE NETWORKS/SCAFFOLDS WITH APPLICATIONS IN DRUG DELIVERY, TISSUE ENGINEERING, CATALYSIS ETC.

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Technology

- A novel process of preparing self standing, crosslinked networks (scaffolds) of nanoparticles from commonly available materials as
  - Metalllic particles
  - Inorganic particles
  - Organic and polymeric compounds
  - Semi conducting and magnetic particles
- Scaffolds have controllable mesh size
  - Pore size ranges from 500 nm to 1 mm (nano to micro porous)
  - Particle volume fraction is between 0.5 to 50%
- Directionality of the pore formation can also be precisely maneuvered
- Has a wide range of applications in various areas

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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

*A meta material is a substance that derives its electromagnetic properties from its structure rather than from its chemical composition.

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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
- Metamaterials had a European market size of EUR 133 million in 2007 and are expected to grow to EUR 2.1 billion in 2013, at a compound annual growth rate (CAGR) of 26.5 %[3]
- The global market for drug delivery has been projected to exceed $57 billion by 2012[4]

[1] http://www.freedoniagroup.com/Nanomaterials.html viewed 01/08/11
[2] http://www.freedoniagroup.com/World-Nanomaterials.html viewed 01/08/11
[3]Nanostructured Metamaterials Exchange between experts in electromagnetics and material science- Report, Pg 3. (http://ec.europa.eu/research/industrial_technologies/pdf/brochure-metamaterials_en.pdf)- viewed 03/06/11
[4]www.biomedtrends.com/GetDetails.asp?CatName=Bio%20Lab viewed- 14/06/11

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Value

- Generic production procedure
- Can be prepared from readily available materials
  - Metallic particles such as gold
  - Inorganic particles such as silica
  - Organic and polymeric compounds
  - Semiconducting and magnetic particles
- Can be formed in to ordered, structured phase, lamellar, spongy, cubic-preferably hexagonal network
- Has a precisely controllable directionality and pore size

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Technology Status, IP Status

- Patent application filed
- Demonstrated at lab scale
- Ready to be licensed/commercialized

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Links & References

- Self-Standing Three-Dimensional Networks of Nanoparticles With Controllable Morphology by Dynamic Templating of Surfactant Hexagonal Domains (2011) *Chem. Mater.*, 23 (6), 1448–1455
- Draper, M. et *al.* (2011) Self-Assembly and Shape Morphology of Liquid-Crystalline Gold Metamaterials, *Adv. Funct. Mater.*, 21, 1260–127.
- Patent application
  - WO2010070679

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Summary

Technology Summary	
Technology title	Self standing nanoparticle networks/scaffolds with applications In drug delivery, tissue engineering, catalysis etc.
Industry /sector	Pharmaceuticals, tissue engineering, advanced materials
Year of development	2009
Related patents (with links)	Patent application filed
Technology readiness level	Demonstrated at lab scale
Licensing status	Ready to be licensed /commercialized
Encumbrances	None
Availability	Yes

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