Casting Of Carbonaceous Materials In Porous Silicon Nanostructures

Tech ID: 22998 / UC Case 2011-071-0

TECHNOLOGY DESCRIPTION

University researchers have developed methods to synthesize structured glassy carbon nanofibers inside the pores of a porous silicon template by carbonization and obtain free-standing nanofiber by dissolution of the porous silicon template. The carbon nanofibers adopt the shape and morphology of the porous silicon template. The carbon/porous silicon composites are robust, surviving repeated thermal and organic vapor adsorption cycles. The carbon nanocasting approach creates surfaces that: (a) have increased affinity for non-polar organic molecules such as toluene, leading to a 10× improvement in the sensitivity of the sensor; (b) have increased surface area relative to the template leading to greater capacity as an adsorbent; (c) are very stable; and, (d) uniformly cover the underlying silicon layer.

APPLICATIONS

Possible applications for the carbon/silicon composite include optical-based sensors for chemical or biological compounds, as pre-concentrators for chemical or biological species contained in air or water samples, as electrode materials (e.g., for Li-ion batteries, supercapacitors, or active information display elements), and optical components. Possible applications for the freestanding carbon nanofiber arrays include field-emission arrays, electromagnetic shielding components, and porous electrode materials.

INTELLECTUAL PROPERTY INFO

This invention has a patent pending and is available for licensing.

International Application No.: PCT/US2011/053965

RELATED MATERIALS

- "Carbon and Carbon/Silicon Composites Templated in Rugate Filters for the Adsorption and Detection of Organic Vapors" Advanced Materials, Volume 23, Issue 15, pages 1776–1781, April 19, 2011 - 04/19/2011

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,499,407	11/22/2016	2011-071

CONTACT

University of California, San Diego
Office of Innovation and Commercialization
innovation@ucsd.edu
tel: 858.534.5815.

OTHER INFORMATION

KEYWORDS

porous silicon; photonic crystals; composite materials; sensors; microstructures

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Materials & Chemicals**
  - Composites
  - Storage
- **Sensors & Instrumentation**
  - Analytical
  - Biosensors

RELATED CASES

2011-071-0