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Toxicity of single-walled carbon nanotube:  
How we were wrong?

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### ■ Research News

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### ■ Opinion | David Bradley

Gen F Scientists

"The war of the research social networks has begun...only the best, most interesting, and most scientific will survive."

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## Updates

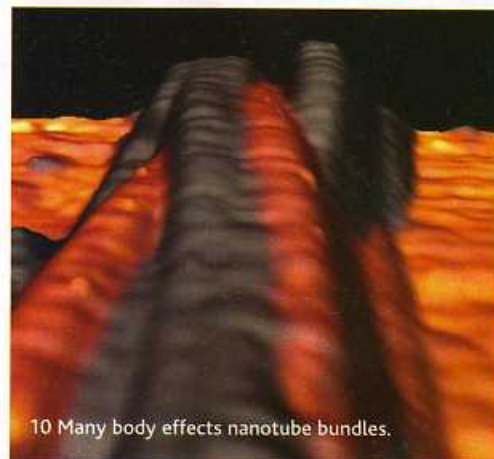
### ■ Diary

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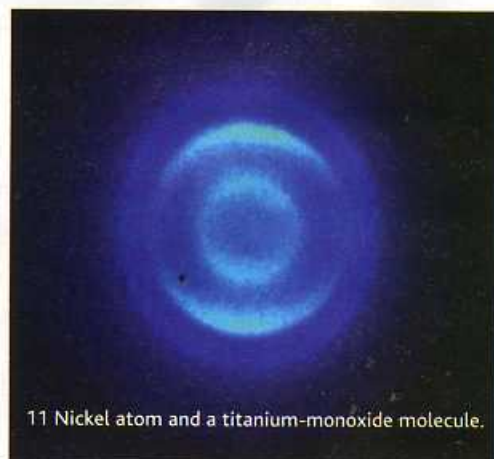
### Cover Image

The figure shows a PDMS chamber with YinYang shape submerged in one well of a standard 12-well plate filled with culture medium (DMEM supplemented with 10% FBS). At the beginning of the experiment, we filled the chamber with a solution of fibroblasts (NIH/3T3, ATCC) in collagen type-I (1mg/ml in PBS, Invitrogen) at a density of  $2.5 \times 10^6$  cells/ml and allowed the solution to gel at 37°C. Six hours after filling the PDMS chambers, the YinYang-shaped collagen block had reduced its size dramatically by the action of the fibroblasts remodeling their environment similarly to how these cells would do during wound healing.

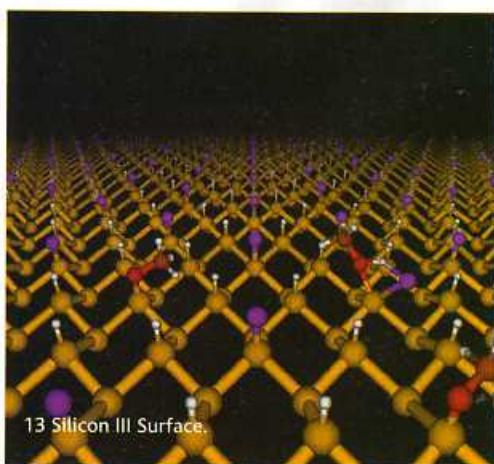
Raquel Perez-Castillejos, New Jersey Institute of Technology (NJIT), USA



10 Many body effects nanotube bundles.



11 Nickel atom and a titanium-monoxide molecule.



13 Silicon III Surface.





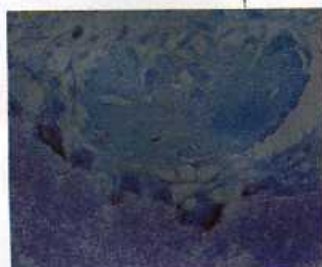
## Lead story 14

### Biomimetic materials in tissue engineering

Biomaterial matrices are being developed that mimic the key characteristics of the extracellular matrix, including presenting adhesion sites and displaying growth factors in the context of a viscoelastic hydrogel. This review focuses on two classes of materials: those that are derived from naturally occurring molecules and those that recapitulate key motifs of biomolecules within biologically active synthetic materials.

Jennifer Patterson, Mikael M. Martino, and Jeffrey A. Hubbell

# Biofunctional materials

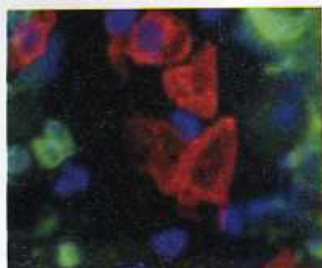


## ■ Review 24

### Resorbable biomaterials as bone graft substitutes

Bohner aims at presenting a concise, accessible overview of the field of resorbable bone graft substitute materials. A slight emphasis is set on synthetic materials, in particular calcium phosphates.

Marc Bohner



## ■ Review 32

### Replication of the 3D architecture of tissues

In this paper Perez-Castillejos reviews methods for replicating *in vitro* the 3D histoarchitecture of live tissues, focusing on those approaches that use (or are compatible with) tissue-harvested scaffolds.

R. Perez-Castillejos



## ■ Insight 42

### Analysis of an ultra hard magnetic biomineral in chiton radular teeth

Through the use of modern techniques, the architectural and mechanical properties of the radular teeth from *Cryptochiton stelleri* are described. Weaver *et al.*, explains how the unique multi-phasic design of these materials contributes not only to their functionality, but also highlights some interesting design principles that might be applied to the fabrication of synthetic composites.

James C. Weaver, Qianqian Wang, Ali Miserez, Anthony Tantiuccio, Ryan Stromberg, Krassimir N. Bozhilov, Peter Maxwell, Richard Nay, Shinobu T. Heier, Elaine DiMasi, David Kisailus

## Next issue

**Materials Today looks at carbon nanotubes and graphene for electronic applications.**

### The carbon new age

One of the most interesting aspects of C chemistry is the fact that its electronic states are better described in terms of the hybridization of pure s and p hydrogen-like states.

### Carbon nanotubes for coherent spintronic devices

Carbon nanotubes bridge the molecular and crystalline quantum worlds, and have extraordinary electronic, mechanical and optical properties.

### Visualizing Graphene-based sheets

Graphene, graphene oxide and reduced graphene oxide have stimulated great interest due to their promising electronic, mechanical and thermal properties.

### Graded cross-links for stronger nanomaterials

Cross-links are nowadays recognized to play a key role in the overall mechanical strength of buckypapers, nanotube or graphene based materials.

### Graphene, a promising transparent conductor

New electronic devices such as touch screens, flexible displays, and solid-state lighting have led to a rapidly growing market for flexible transparent conductors.