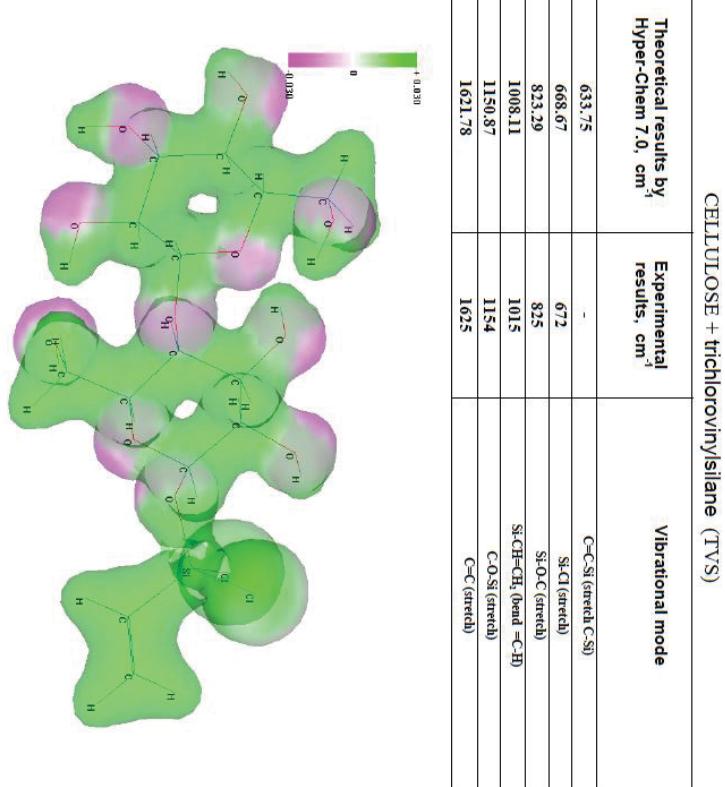


**Figure 1. Silanization reactions of the cellulose fiber (rice husk).**

a)Cellulose-TMS, b)Cellulose-DDS, c)Cellulose-TVTS.

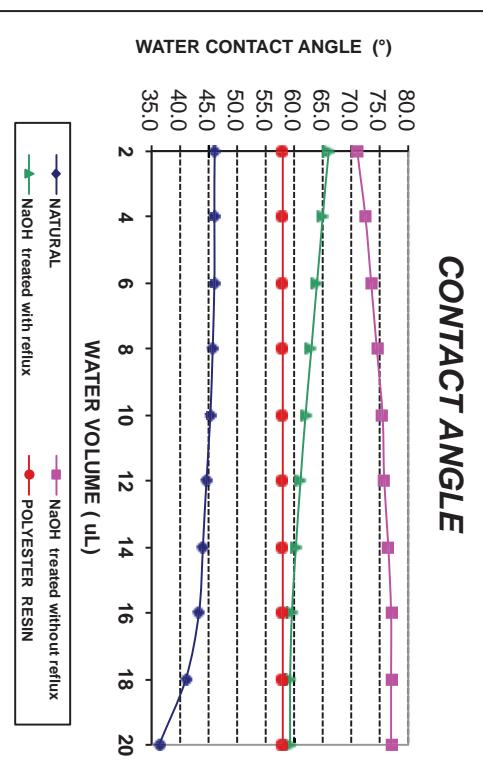


$$\frac{h_F \leq \phi + E_{max}}{h_0, h_0 = \lambda \cdot w_0} \rightarrow A_{\phi} = \lambda \cdot w_0$$

Controlling  
Pore Adhesive  
Indication  
Unsaturated  
Polyesters



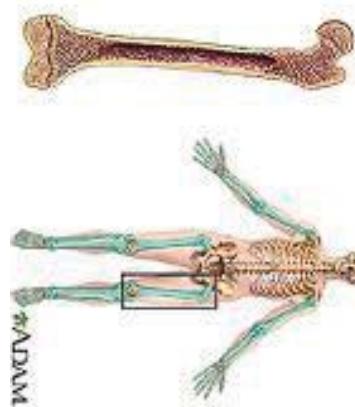
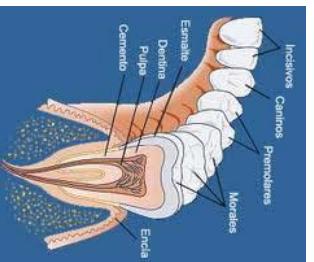
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# Dental materials and bone-replacements



Bone:  
Synergetic combination of  
Hydroxyapatite (HAp) and collagen



Normal bone



Bone with Osteoporosis



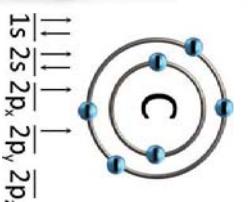
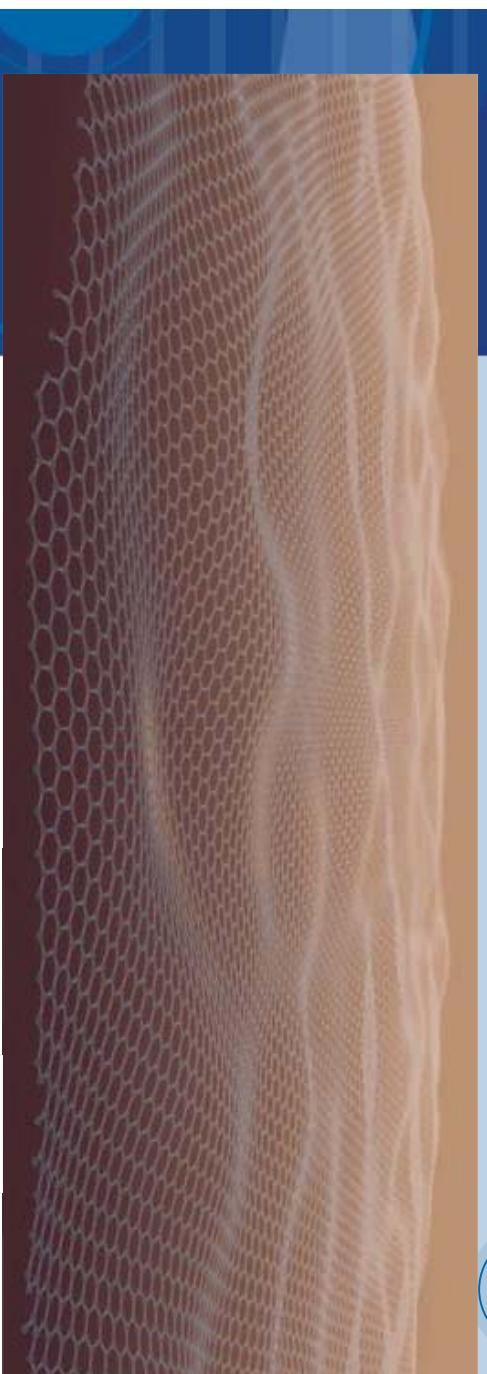
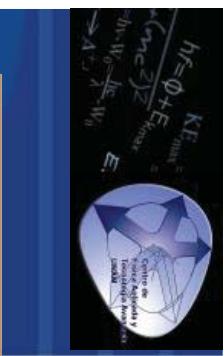
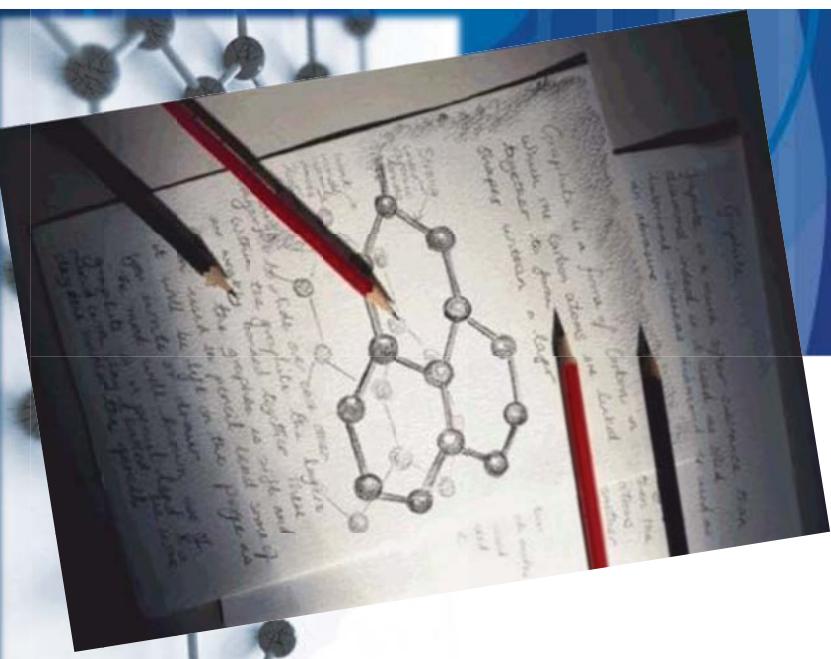
# 2D CRYSTALS:

## AN OLD DREAM COMES TRUE



- 1940's: Landau y Peierls, 2D crystals are thermodynamically unstables.
- 2004: **graphene and boron nitride 2D structures isolated**
- Graphene crystallites: stability thanks to curvature of sheets
- Great elastic energy, while diminishing thermal vibrations

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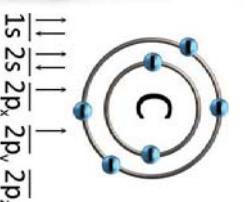


→  $sp^1$

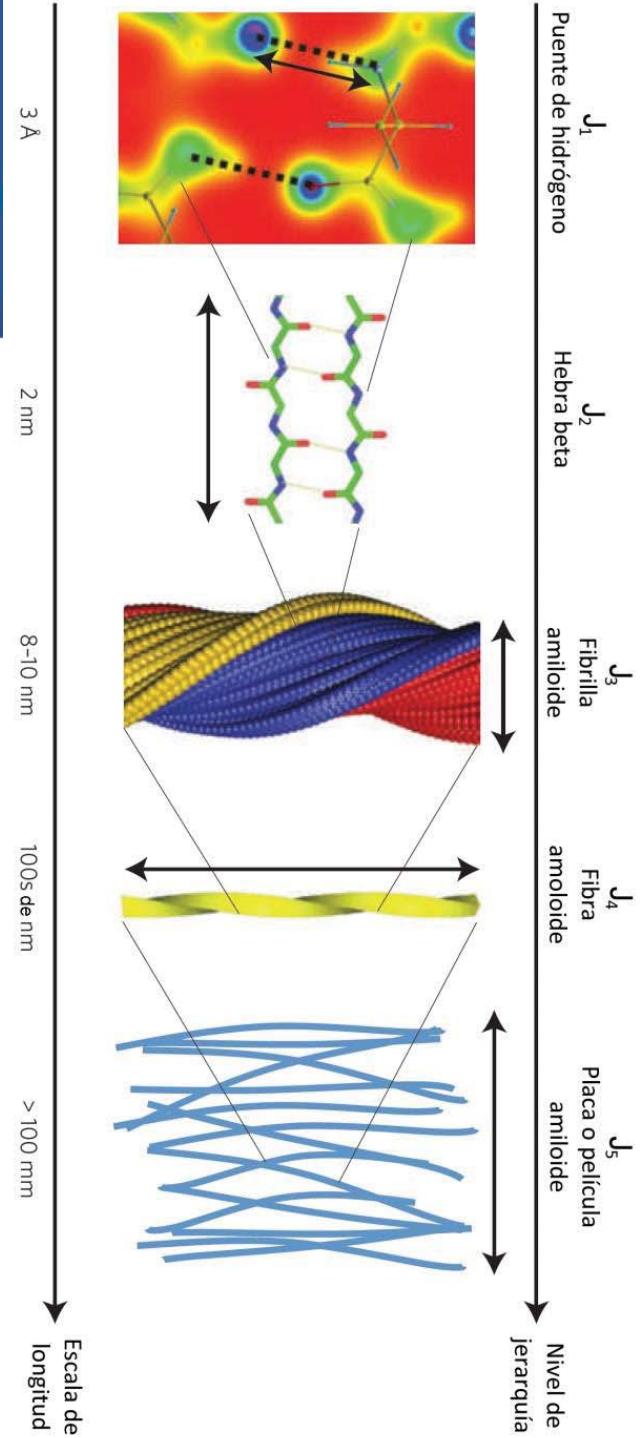
→  $sp^2$

→  $sp^3$

Novel molecular materials



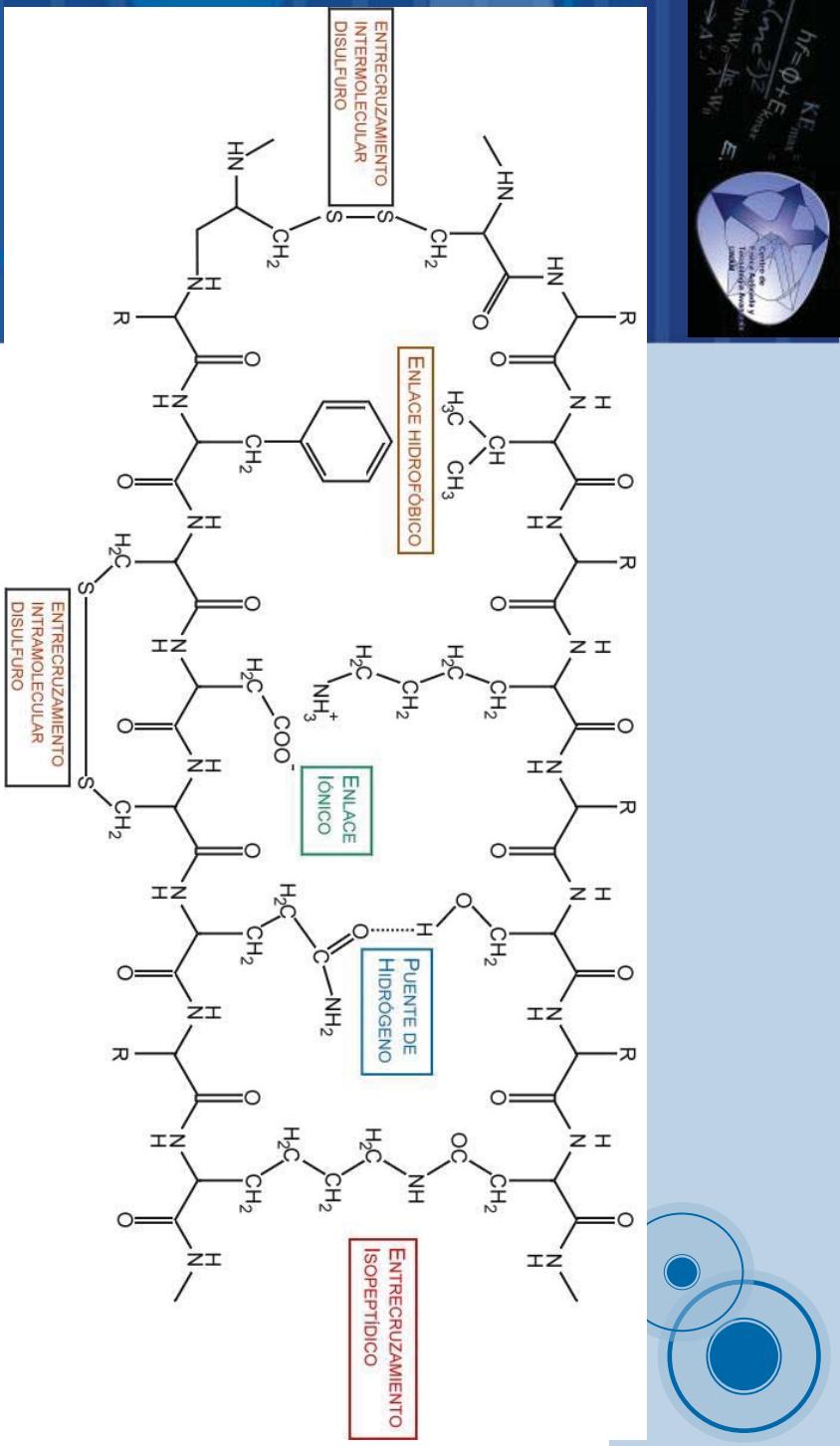
Novel molecular materials



# PROTEINS = SELF ASSEMBLING

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Types of bonding possible in keratin





| MATERIAL               | CODE      | COLOR |
|------------------------|-----------|-------|
| <b>Graphite</b>        | <b>GR</b> | ●     |
| <b>Graphite oxide</b>  | <b>GA</b> | ●     |
| <b>Graphene</b>        | <b>GO</b> | ●     |
| <b>Keratin</b>         | <b>GE</b> | ●     |
| <b>Chitosan/Starch</b> | <b>KE</b> | ●     |
|                        | <b>QA</b> | ●     |



# Nanodiamond... from tequila!!!

Rev. Adv. Mater. Sci. 21(2009) 134-138



## GROWTH OF DIAMOND FILMS FROM TEQUILA

J. Morales<sup>1,2</sup>, L.M. Apártiga<sup>2</sup> and V.M. Castaño<sup>2</sup>

<sup>1</sup>Facultad de Ciencias Físico Matemáticas, Universidad Autónoma de Nuevo León, Av. Universidad S/N,  
San Nicolás, Nuevo León, México 66450. Mexico

<sup>2</sup>Centro de Física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México, Boulevard  
Juárez 3001, Santiago de Querétaro, Querétaro, México 76230, Mexico

Received: February 19, 2009

**Abstract** Diamond thin films were growth using Tequila as precursor by Pulsed Liquid Injection Chemical (aport Deposition (PLI-CVD) onto both silicon (100) and stainless steel 304 at 850 °C. The diamond films were characterized by Scanning Electron Microscopy (SEM) and Raman spectroscopy. The spherical crystallites (100 to 400 nm) show the characteristic 1332 cm<sup>-1</sup> Raman band of diamond.



**Paracelsus,**  
**Eat Your Heart Out**

Aspirin now tastes like tequila. And it's not just a taste of the good life—it's a taste of medical breakthroughs. The secret to aspirin's success is its ability to inhibit the production of a protein called cyclooxygenase, or COX. By inhibiting COX, aspirin can reduce inflammation and ease pain. But it's not just aspirin that's making waves. Other pain relievers, like ibuprofen, also inhibit COX. So why do we need aspirin? Because it's more effective than ibuprofen at reducing inflammation without causing stomach problems. And it's more affordable. Aspirin has been around since the 19th century, and it's still one of the most popular medications in the world. So if you're looking for a pain reliever, consider aspirin. It might just be the best medicine for your heart.

**Quantum Leap in Space Satellite**

The European Space Agency has taken a major step forward in satellite technology. It has developed a new type of solar panel that can generate twice as much power as traditional panels. This new panel, called the Quantum Leap panel, uses a different material to capture sunlight, which allows it to work even in low-light conditions. The panel is currently being tested on a satellite called the Quantum Leap satellite, which will be launched in 2012. The satellite will be used to test the new panel's performance in space. The team behind the project, led by Dr. Michael Grätzel, believes that this new panel could revolutionize satellite technology, making it more efficient and reliable.

**Homer and the Eclipse**

In the middle of the night, a total solar eclipse occurred over the Pacific Ocean. Homer, a dog owned by a friend of the authors, was watching the eclipse through a telescope. He was so fascinated by the sight that he barked at the moon. His owner, who was also watching the eclipse, thought it was a bit odd, but decided to let him bark. After the eclipse ended, the dog continued to bark, even though the sun had already risen. The owner was confused and asked his friend what was going on. His friend explained that the dog had been barking at the moon during the eclipse, and that's why he was still barking after the sun had risen. The owner was amazed by this behavior and decided to take a picture of the dog barking at the moon. The picture went viral on social media and became a hit.

**GET ONLINE, LITTLE DOGIES**

It's never been easier to keep up with your favorite dog breeds. With the rise of the internet, there are now many websites dedicated to providing information about different breeds of dogs. One such website is Dog Breeds Central, which offers a wealth of information about over 200 different breeds. From the smallest breeds, like Chihuahuas and Shih Tzus, to the largest breeds, like Great Danes and Mastiffs, Dog Breeds Central has got you covered. The website provides detailed profiles for each breed, including their physical characteristics, personality traits, and care requirements. Whether you're looking for a small companion or a large family dog, Dog Breeds Central is the place to go.

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SCIENCE

www.sciencemag.org

Volume 321 Number 5901 July 3, 2009

Editorial: 134; Research: 134-138; Perspectives: 138-139; Letters: 139-140; Book reviews: 140-141; News: 142-147; Features: 148-151; Departments: 152-153; Random samples: 154

## RANDOMSAMPLES

By DAVID R. COWEN AND JULIA HUANG

### BY FROM THE SKY?

THE ECLIPSE WAS A TOTAL SUCCESS. A team of researchers from the University of California, Berkeley, and the University of Colorado at Boulder used a telescope to capture images of the sun during the eclipse. The images showed the sun's surface in great detail, revealing complex patterns of solar activity. The team plans to use these images to study the sun's magnetic field and predict future solar flares. The results of the study will be published in the journal *Science* in the next few weeks.

### BY THE RANDOM SAMPLE

THE ECLIPSE WAS A TOTAL SUCCESS. A team of researchers from the University of California, Berkeley, and the University of Colorado at Boulder used a telescope to capture images of the sun during the eclipse. The images showed the sun's surface in great detail, revealing complex patterns of solar activity. The team plans to use these images to study the sun's magnetic field and predict future solar flares. The results of the study will be published in the journal *Science* in the next few weeks.

Downloaded from www.sciencemag.org on July 3, 2009

$$\begin{aligned}
 h_f &\leq \phi + E_{\max} \\
 \Rightarrow h_i - h_o &\leq E_{\max} \\
 \Rightarrow A_{i,o} &\leq \frac{E_{\max}}{h_i - h_o} = E_i
 \end{aligned}$$

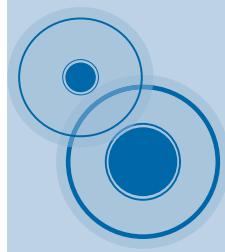


$$\begin{aligned} h_i^{\text{eff}} &\leq \phi + E_{\max} \\ \Rightarrow h_i w_i &\leq \phi + E_{\max} \\ \Rightarrow A_{i,j} &\leq \frac{\phi}{\lambda} + W_0 \end{aligned}$$



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## HIGH PERFORMANCE CARBON



UNIVERSITY OF  
CAMBRIDGE

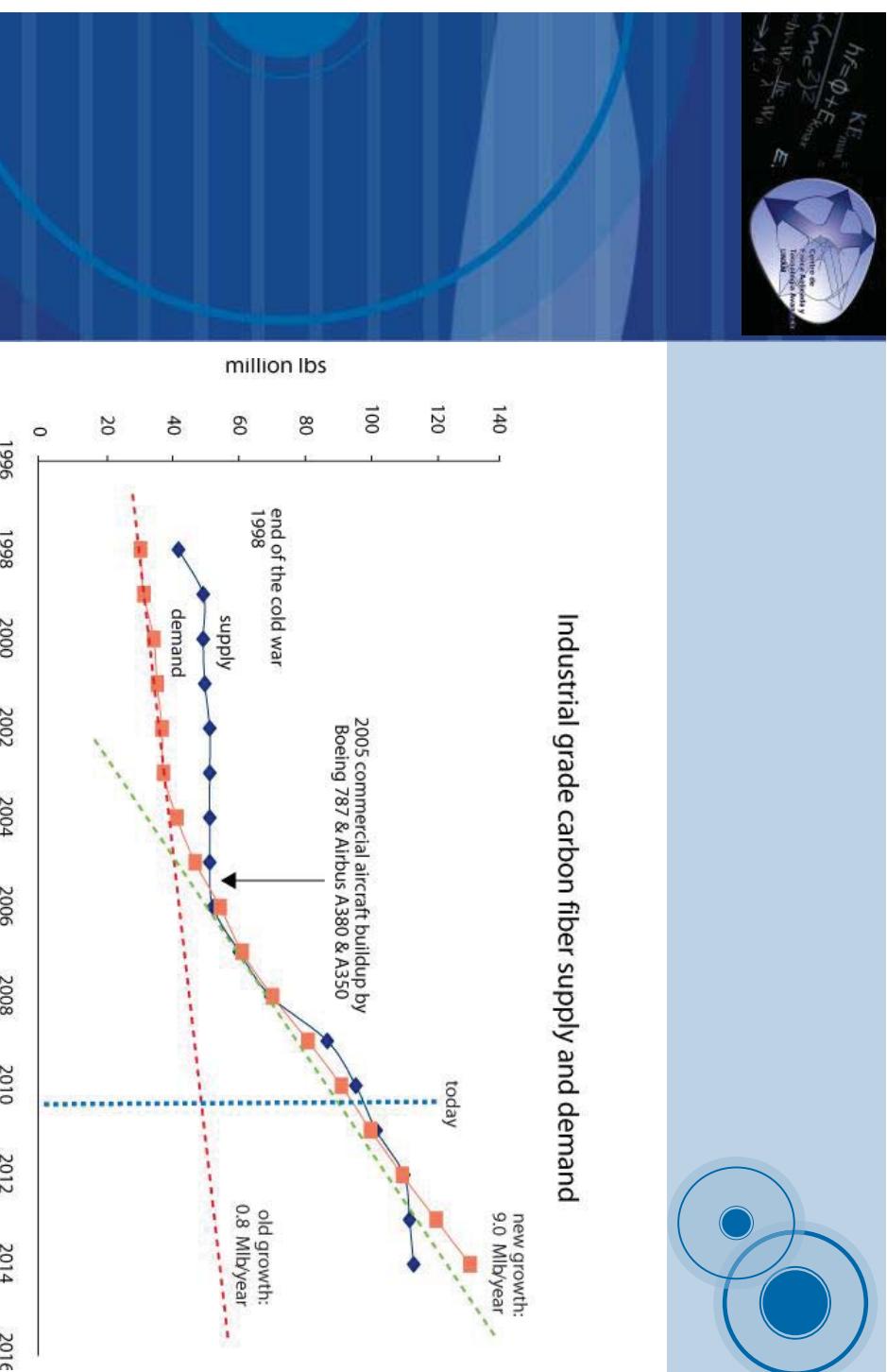
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$$\frac{h_i^{\infty} \phi}{h_i w_i - \lambda w_i} \rightarrow A_{\infty}$$



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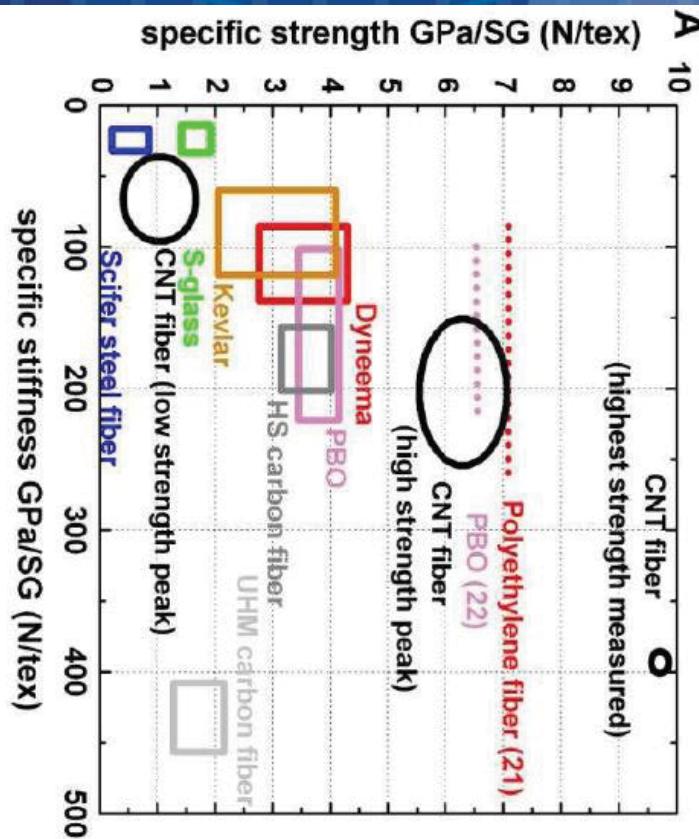
### Industrial grade carbon fiber supply and demand



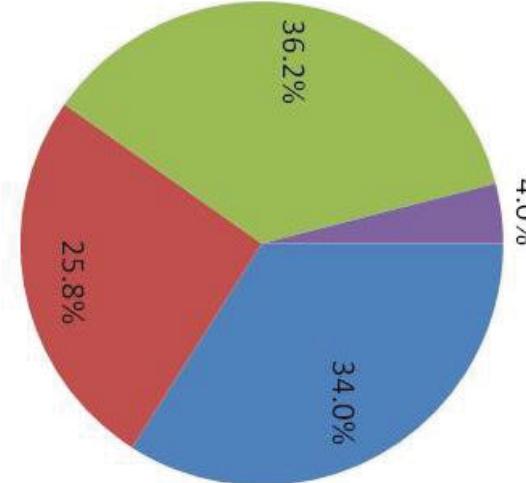
$$h_f \leq \frac{K E_{max}}{\phi + E_{max}}$$

$$\Rightarrow A_{c,r} \leq \frac{K}{\lambda} \cdot \frac{W_0}{W_0} \cdot \Xi_r$$

Controlling  
Fiber Adhesive  
Interaction  
Properties



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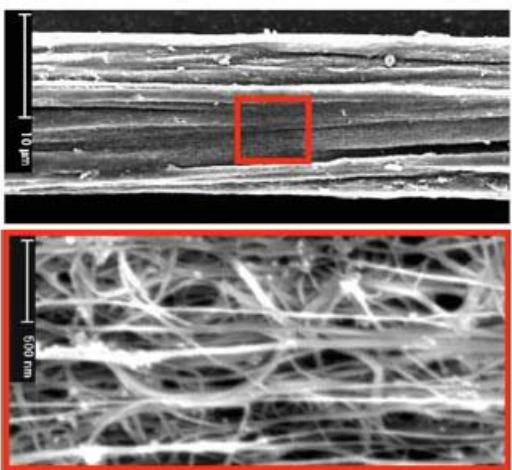
## Global Carbon Fiber Market by Geography, 2010



## CNTs from CVD



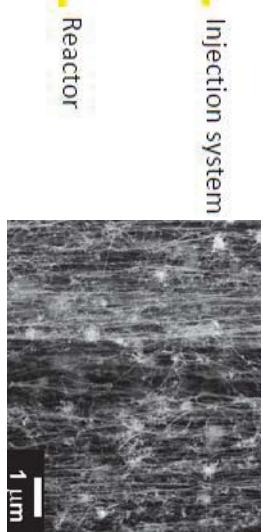
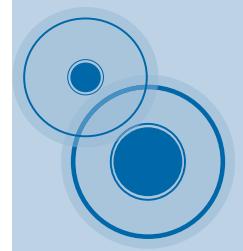
**FIBRE AS PREPARED**



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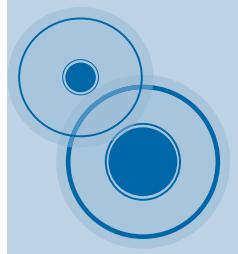
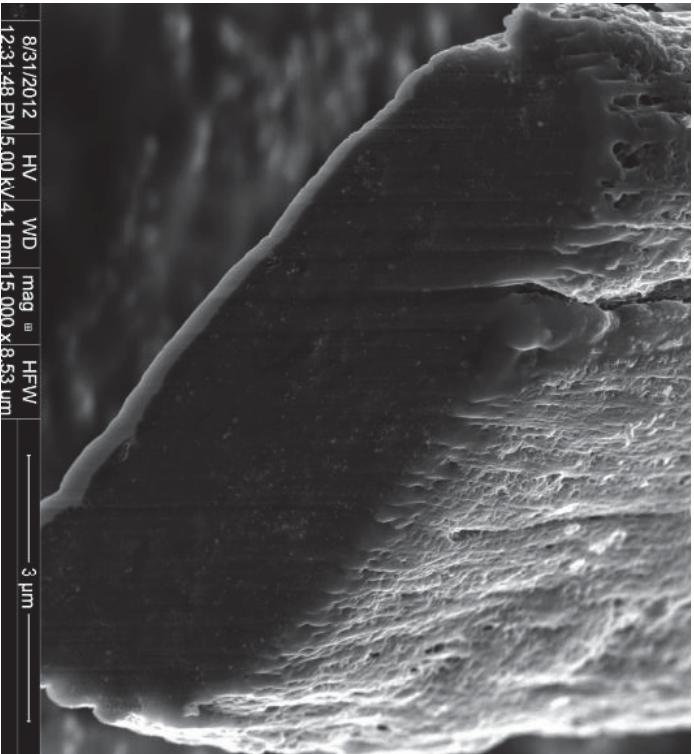
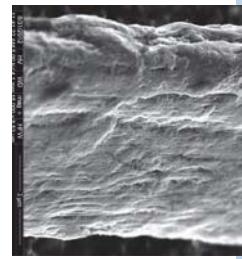
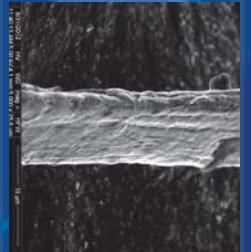
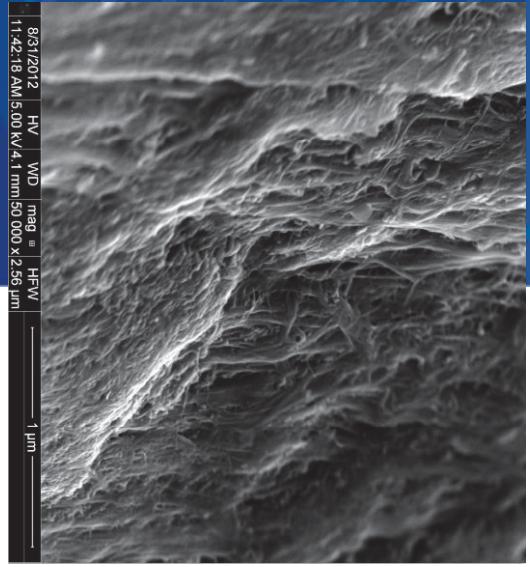


**FIBRE AS PREPARED**



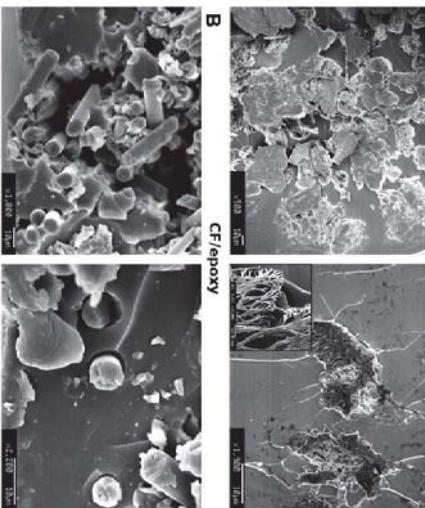
Fibre collection



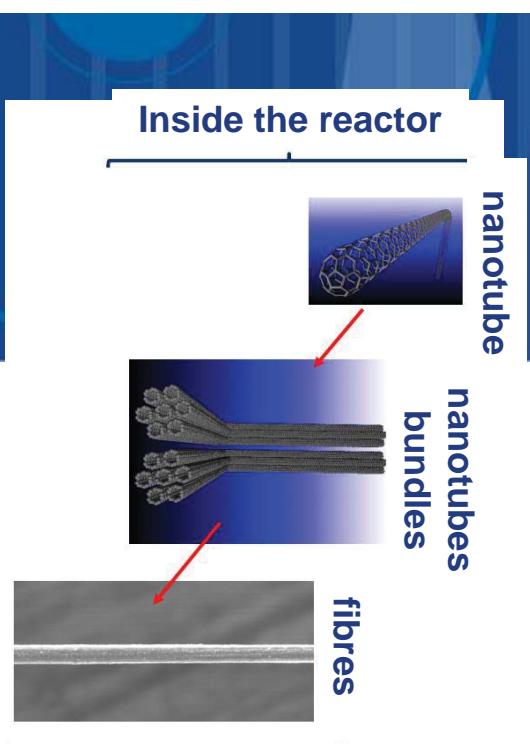


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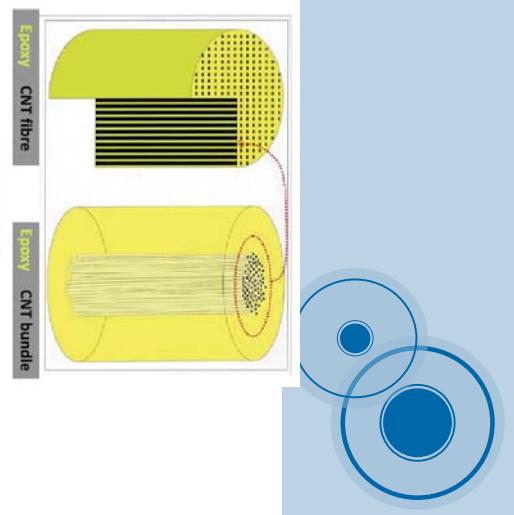
## CNTs/resina epoxic resin fibers



6 to 9 μm



Outside the reactor

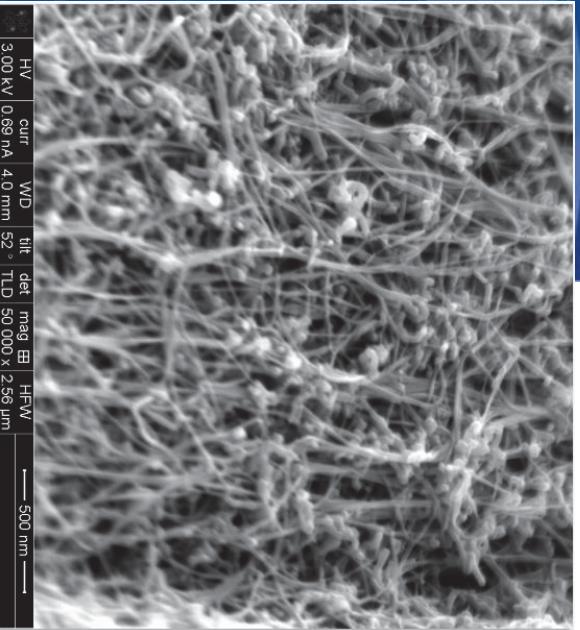


Inside the reactor

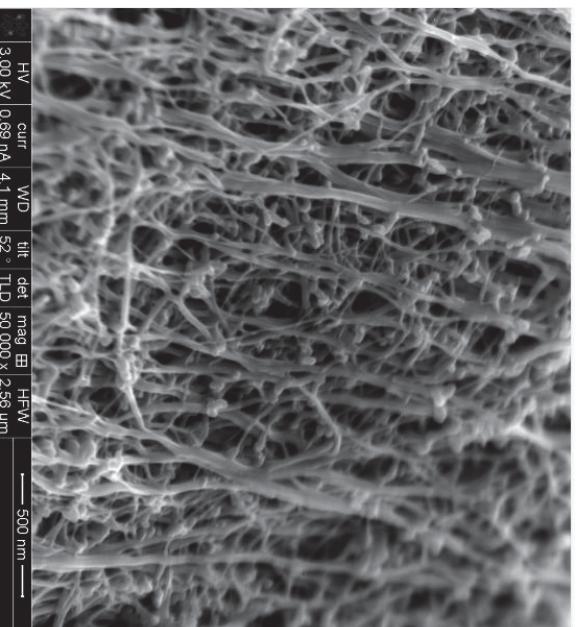


$$\begin{aligned}
 h_f^{\infty} &\leq \phi + E_{\max} \\
 \Rightarrow A_{\infty} &\leq \frac{k}{\lambda} \cdot W_0 \\
 \Xi &= 
 \end{aligned}$$

Without  
interfacial  
treatment



With  
interfacial  
treatment



**Modulus: 1296 CN/tex**      **Modulus: 3842 CN/tex**  
Tenacity: 24 CN/tex      Tenacity: 63 CN/tex

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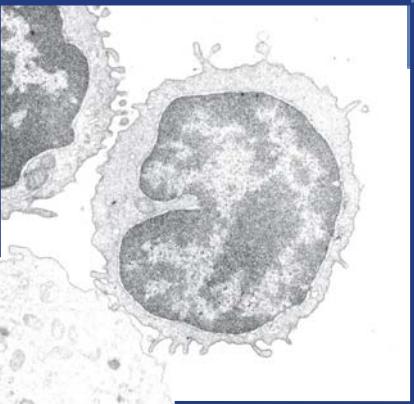


**CONCLUSION:**  
**A Modern Vision of Advanced Materials**  
**For Advanced Manufacturing**

**Biology**

**Chemistry**

**Physics**





# *Victor M. Castaño*

Professor

[vmcastano@ai.org.mx](mailto:vmcastano@ai.org.mx)

[www.victorcastano.net](http://www.victorcastano.net)

Twitter: @VMCastano

Facebook:

[victormanuel.castanomeneses](https://www.facebook.com/victormanuel.castanomeneses)