

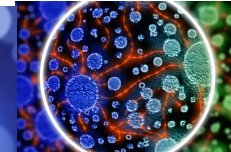
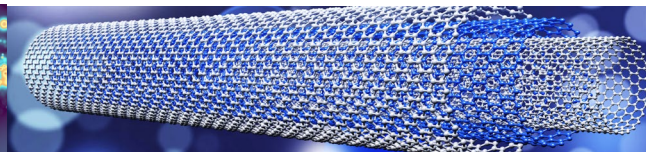
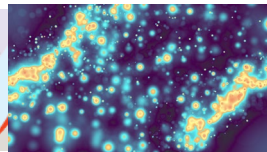


NANOMATERIALS: A TALE OF TWO ALICES

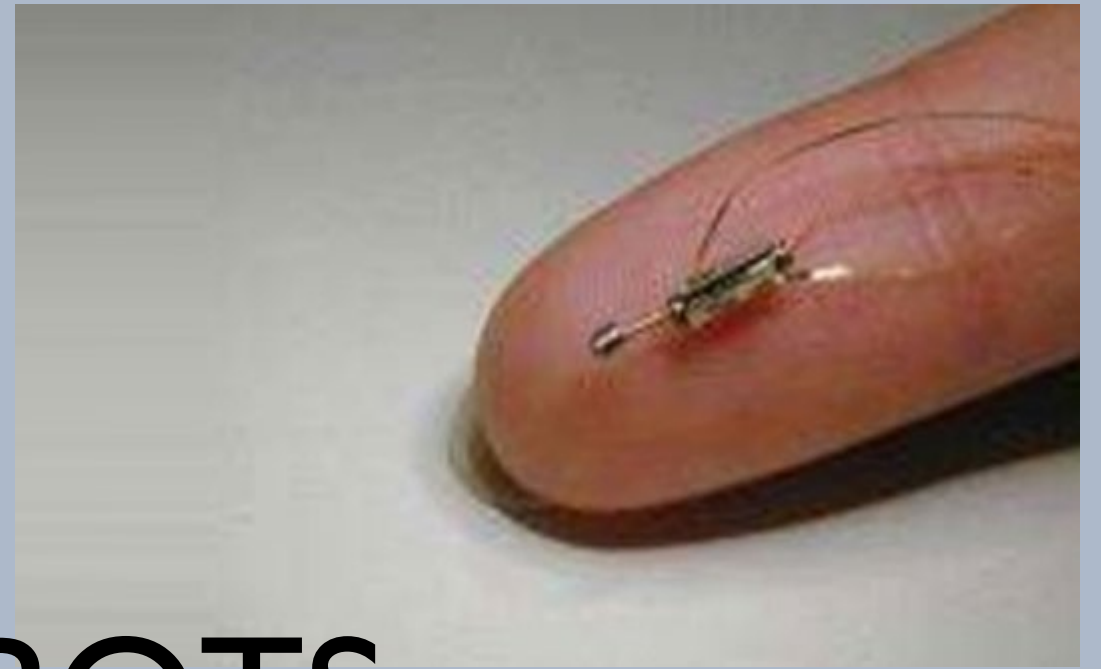
JACQUELINE MCGLADE 13 NOVEMBER 2018



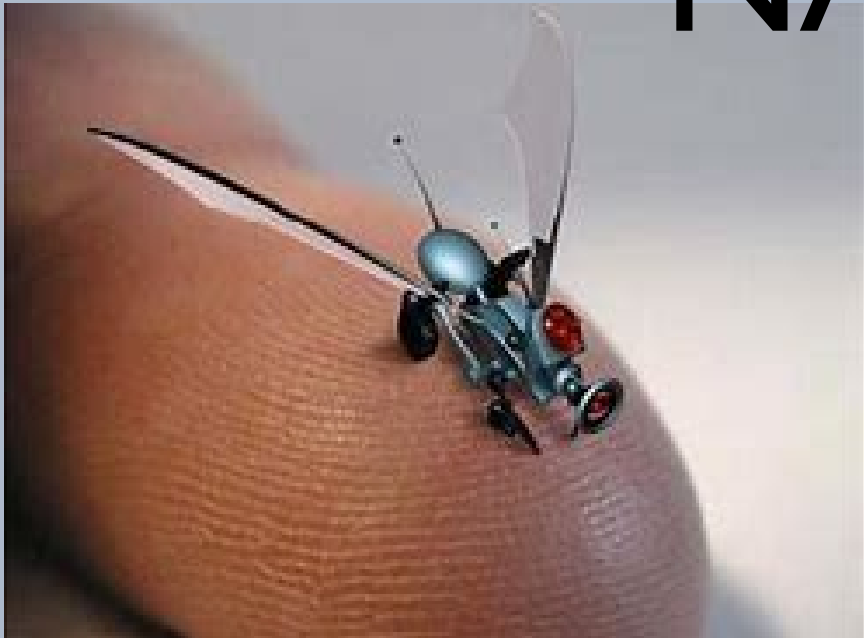
Maasai Mara University
eng'eno e puaan



UCL

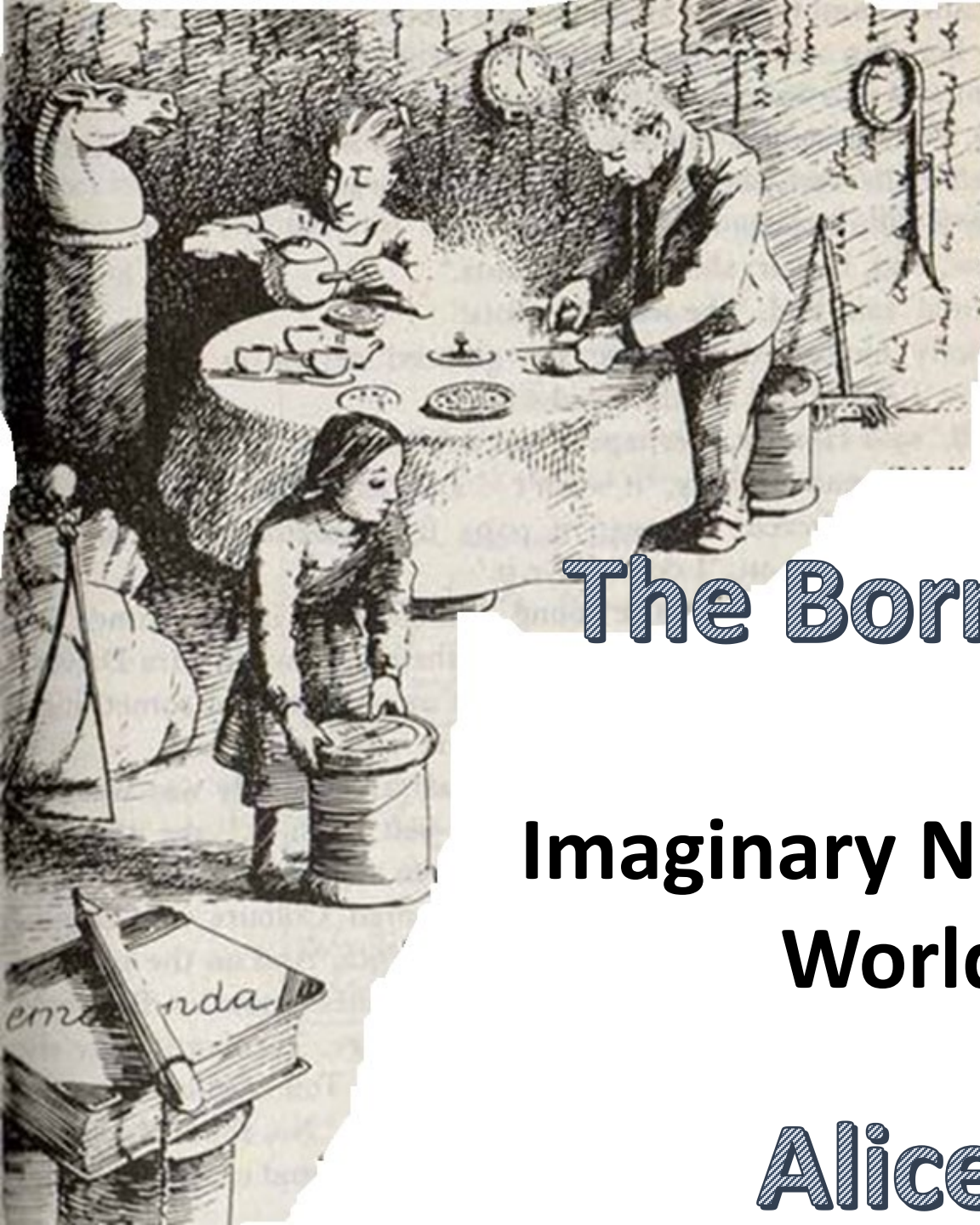


NANOBOTS



NO EVIDENCE OF HARM
 \neq
EVIDENCE OF NO HARM

nanoparticles



The Borrowers

**Imaginary Nanosized
Worlds**

Alice in Wonderland

**DRINK
ME**



ALICE & THE MAD HATTER'S TEA PARTY



Willard Wigan



Credit: Thelondoneconomic.com



**Single-walled
Carbon Nanotube**
1 nanometer diameter

Strand of Hair
100 micrometers
diameter

House
10 meters
wide

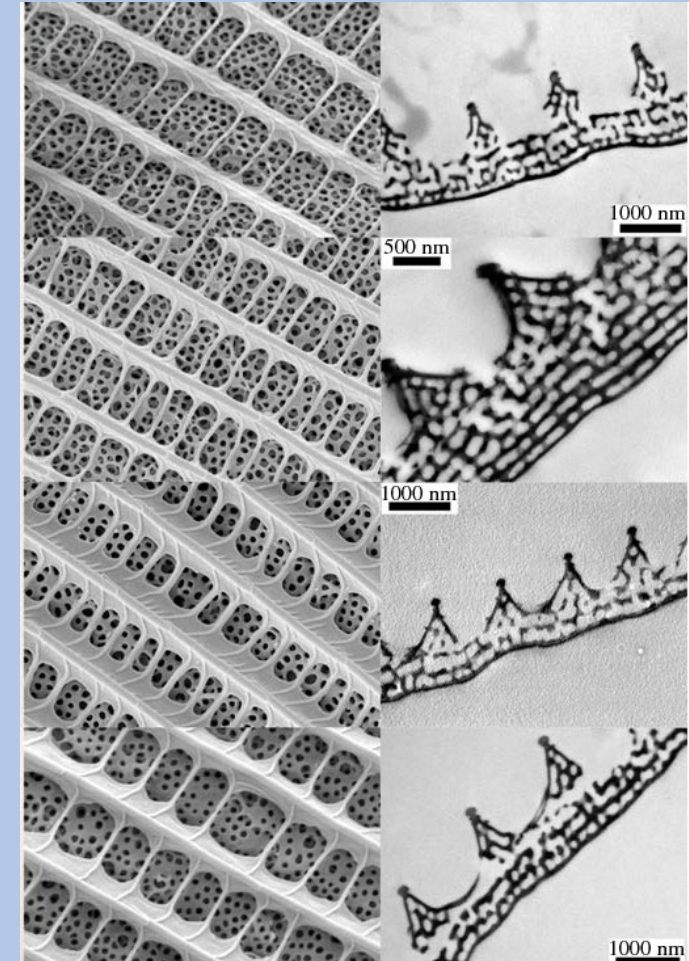
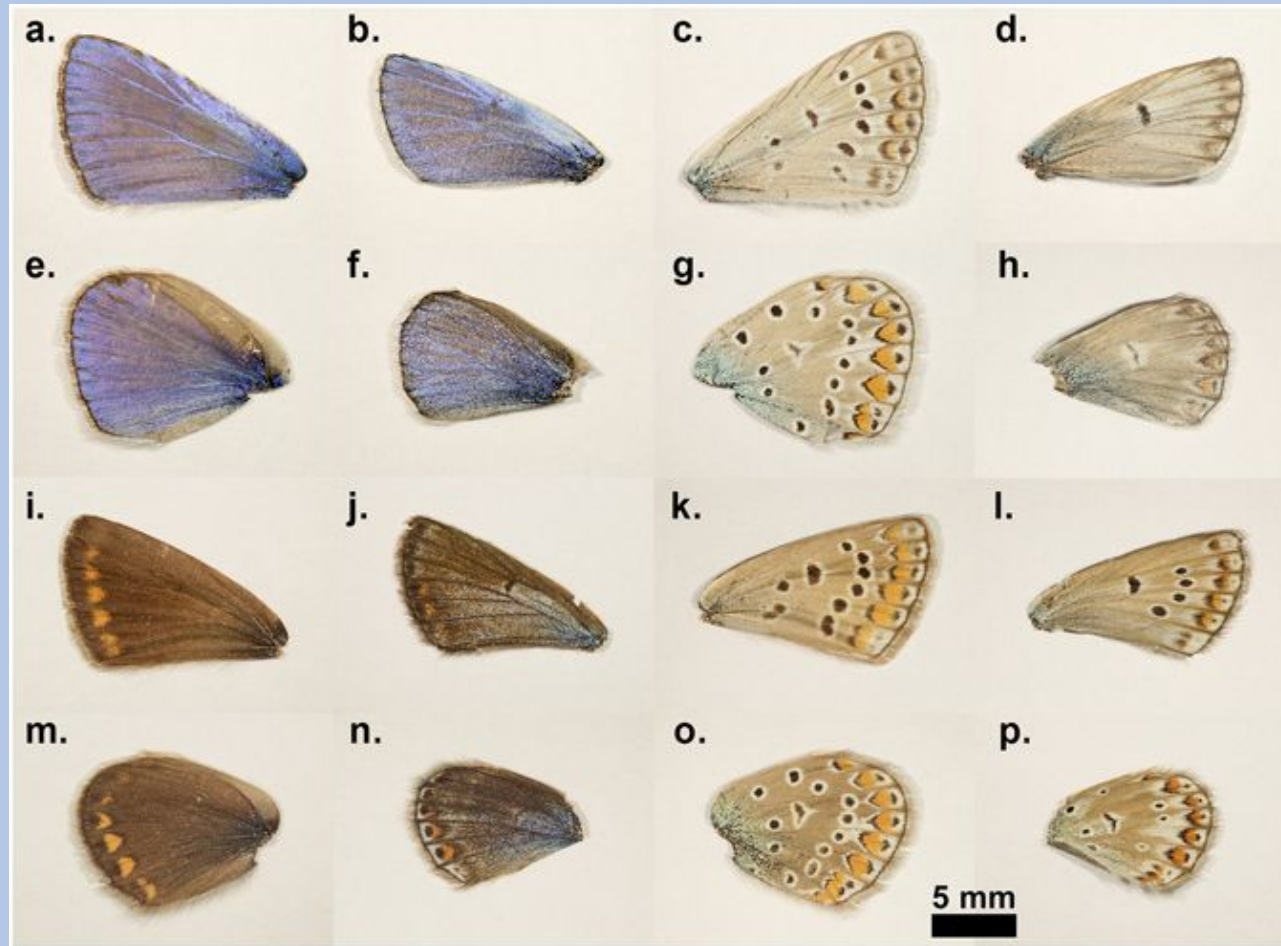
NANOSCOPIC NATURE: STRUCTURAL COLOUR

Larvae wild

Larvae cooled

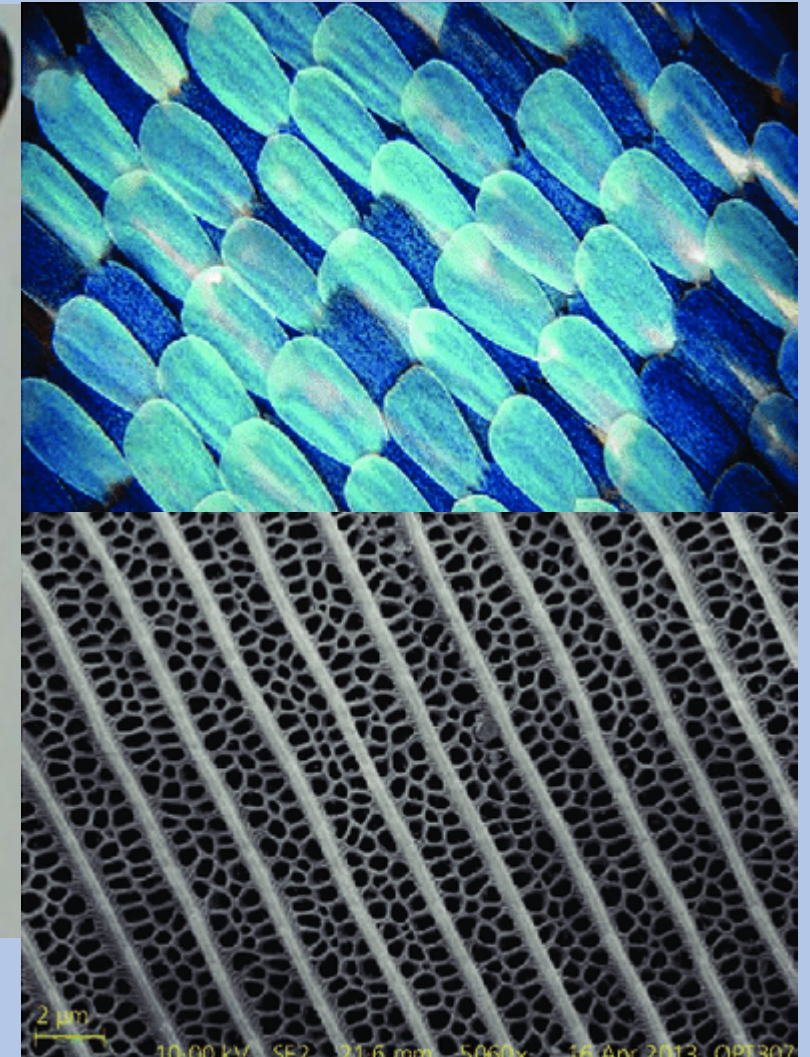
Larvae wild

Larvae cooled



Changes in response to cold stress and nanostructure in *Polyommatus icarus*

Morpho retenor wings showing complex hierarchy of scales

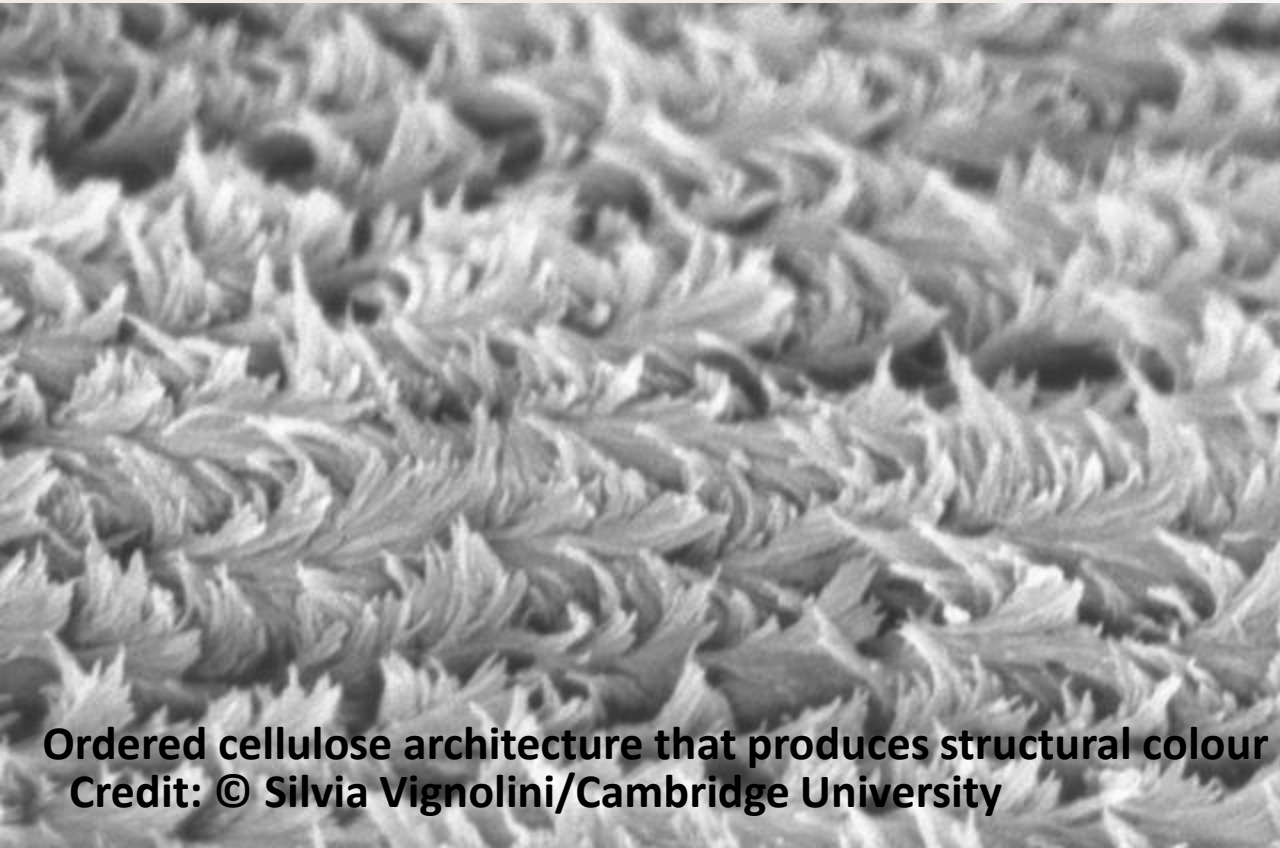




Each vehicle has 300 billion pigment flakes



STRUCTURAL COLOUR

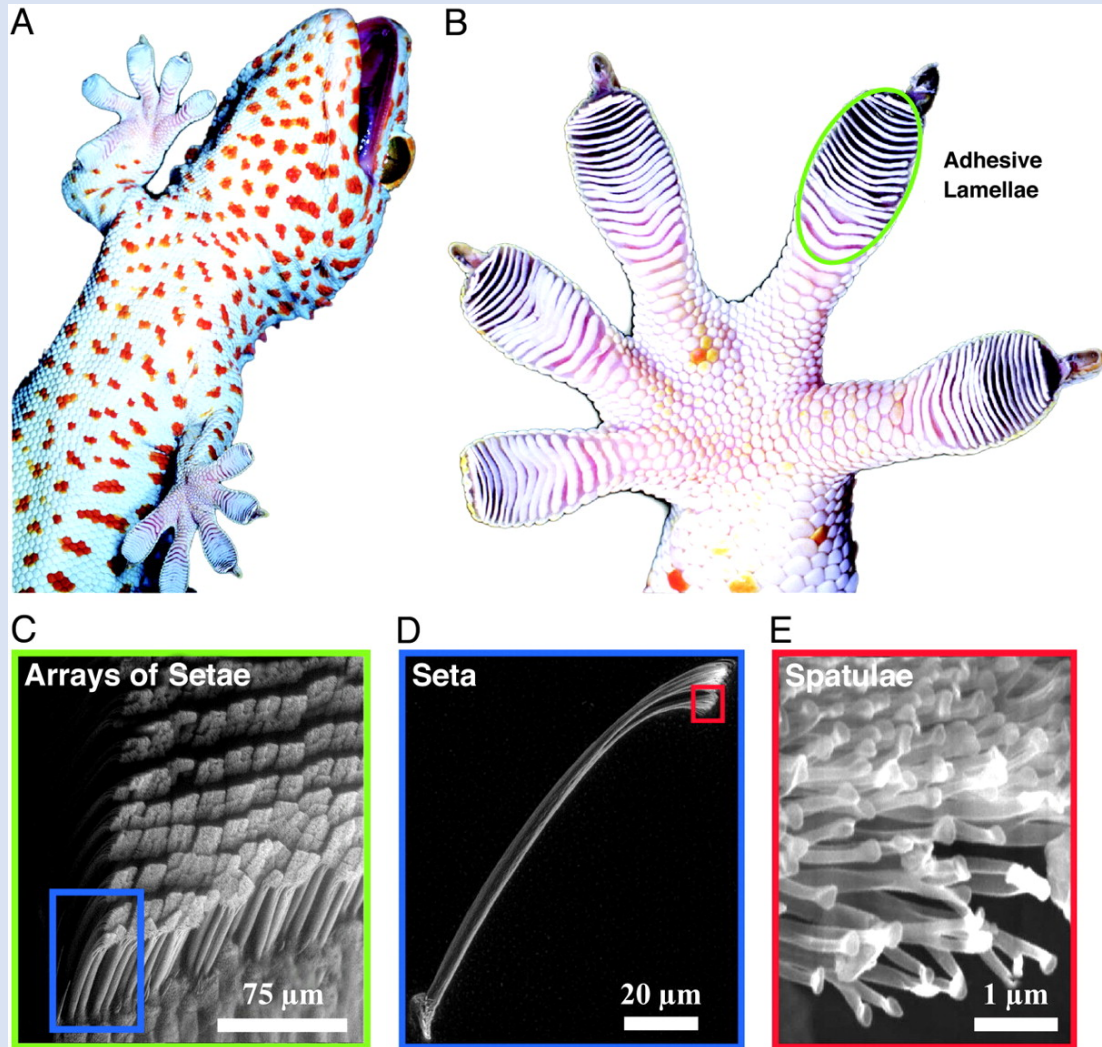


Ordered cellulose architecture that produces structural colour
Credit: © Silvia Vignolini/Cambridge University



Cyphochilus insulanus produces a very opaque white colour from a very thin layer of scales

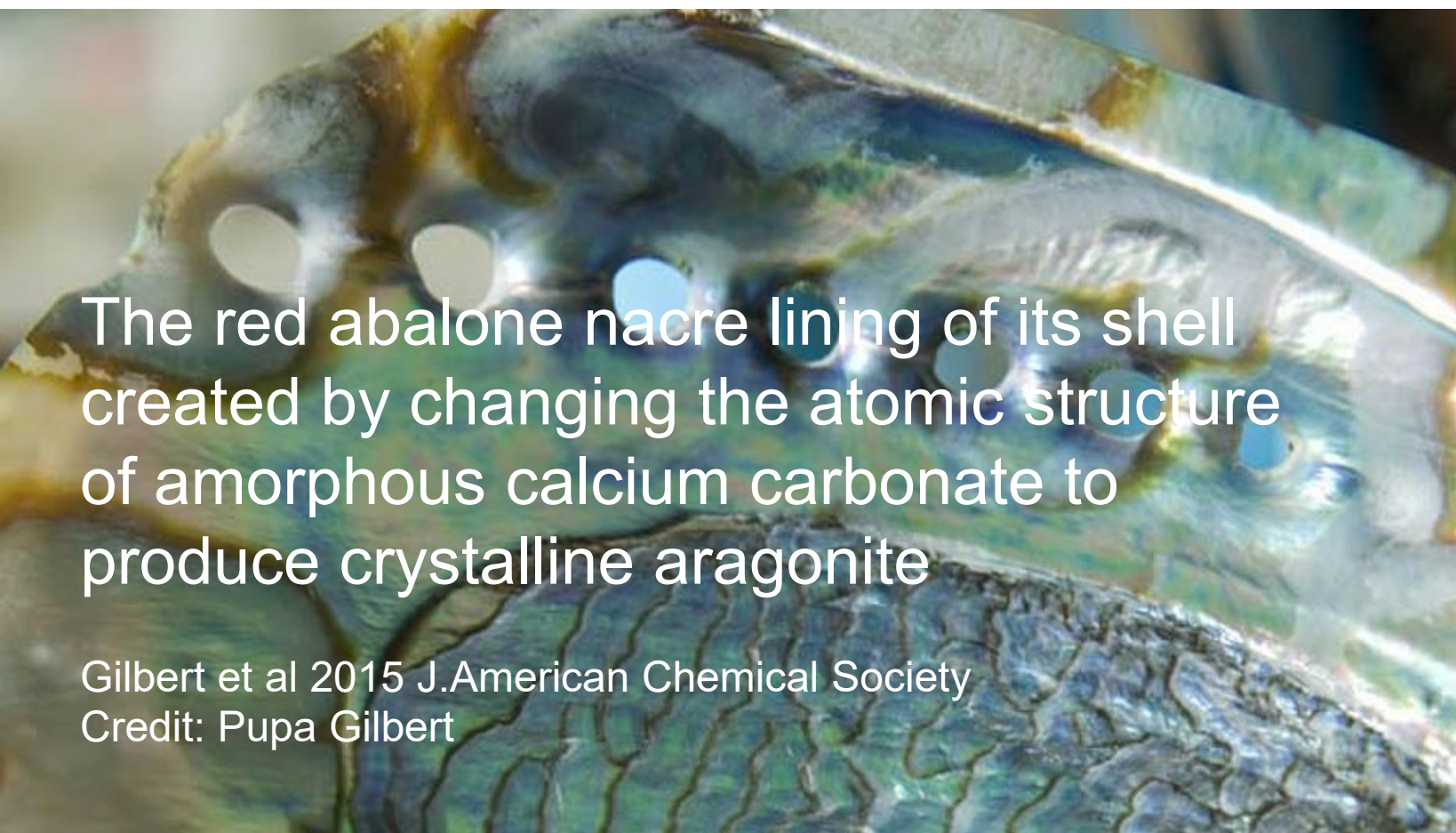
NANOADHESIVES



Gecko adhesive system



NANO BUILDING BLOCKS



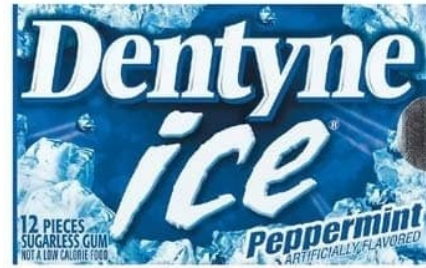
The red abalone nacre lining of its shell
created by changing the atomic structure
of amorphous calcium carbonate to
produce crystalline aragonite

Gilbert et al 2015 J.American Chemical Society
Credit: Pupa Gilbert

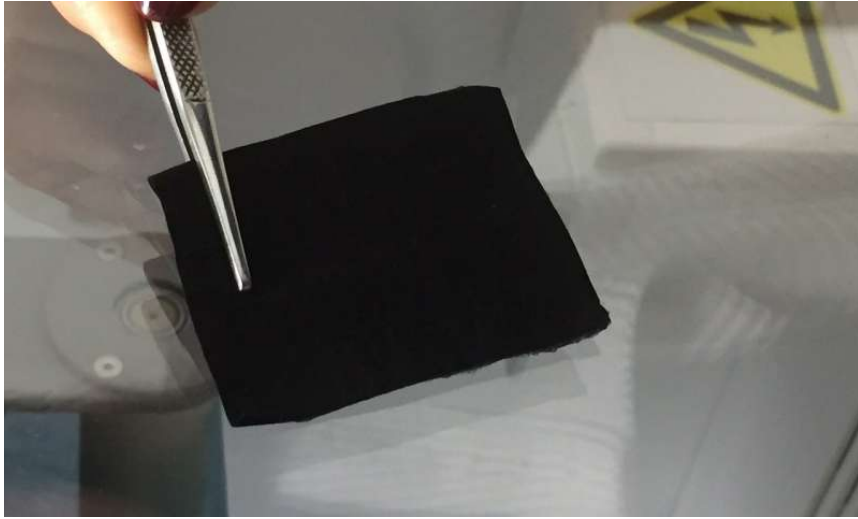


simulated bone

NANOMATERIALS ARE EVERYWHERE



MANUFACTURING NANOMATERIALS

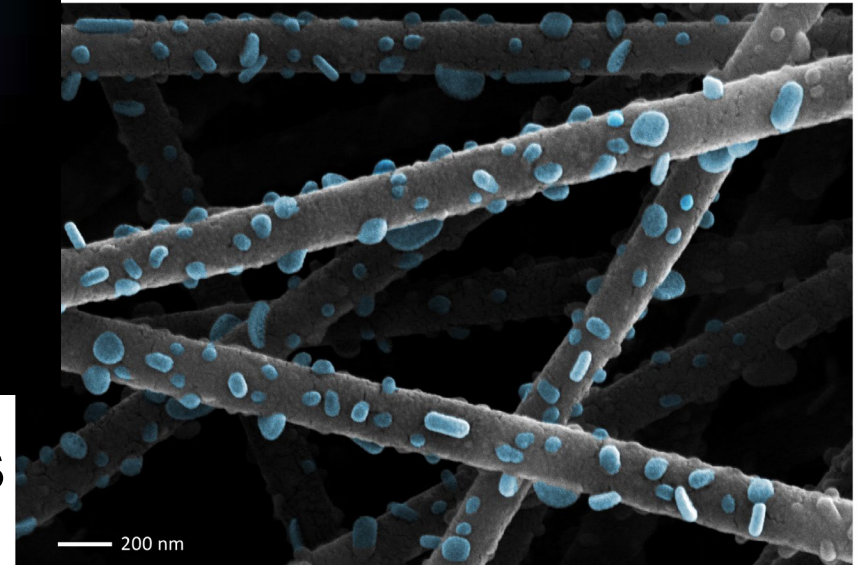


Electrospinning fibres
- smart fabric
Credit: Caltech University



Wearable technologies

Electrospinning
Nanoparticles - fuel cell
Credit: University Edinburgh

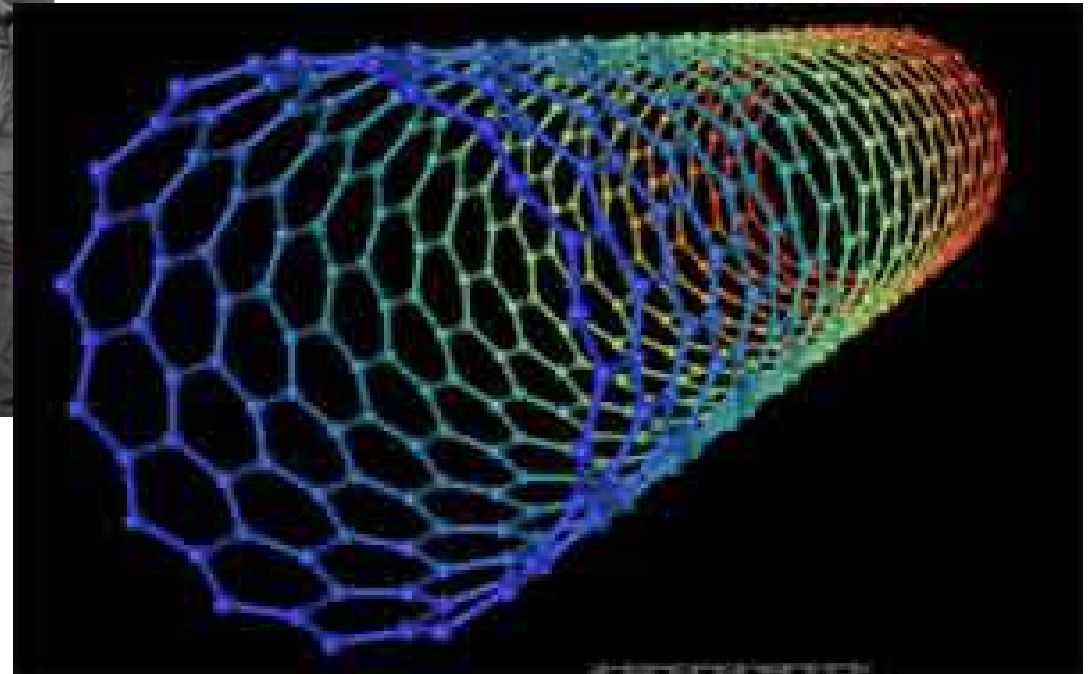


ANCIENT MANUFACTURING

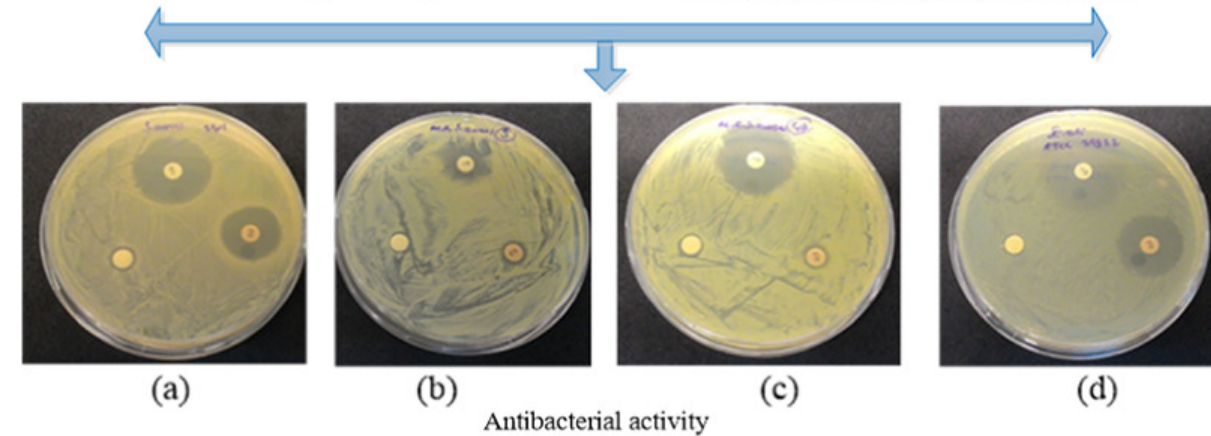
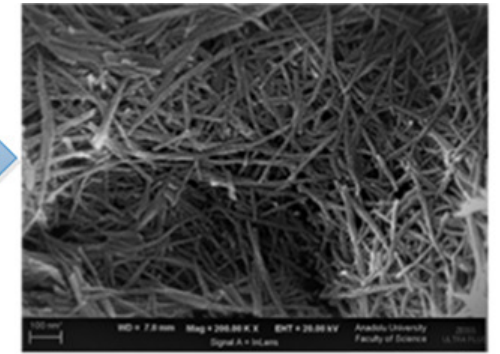
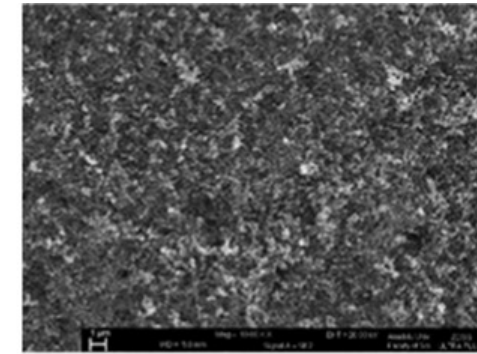
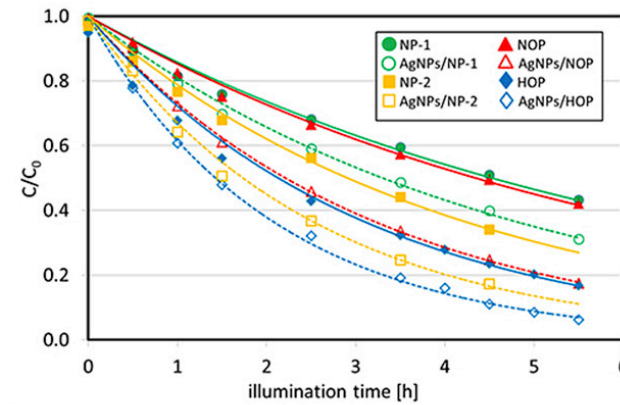
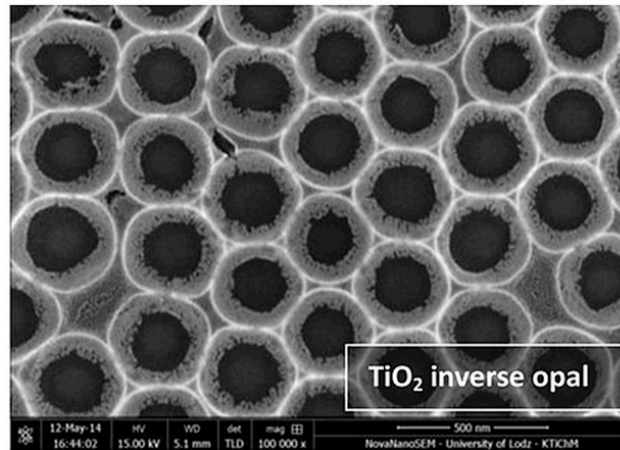
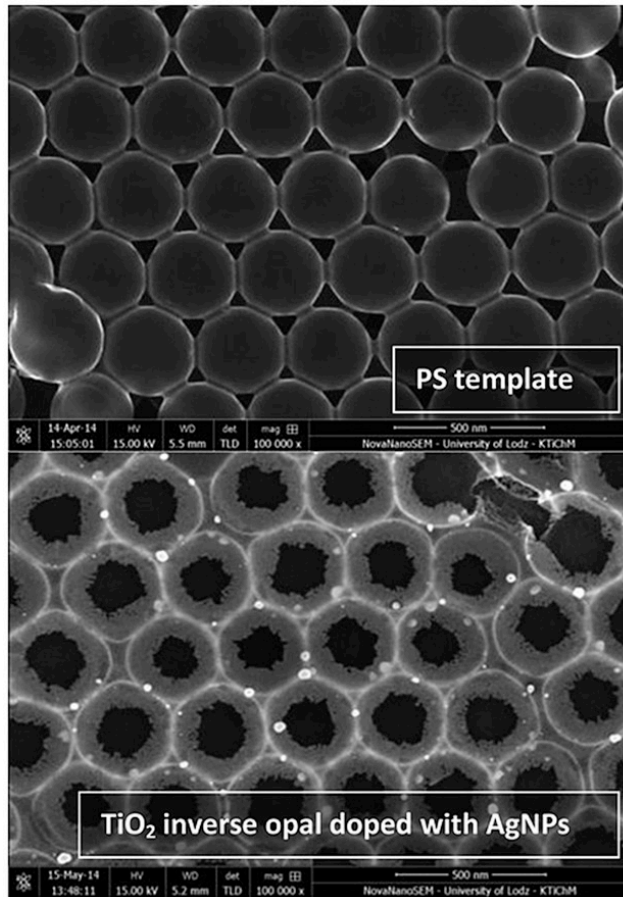


Damascus steel – to make the sharpest and strongest swords

Carbon nanotubes



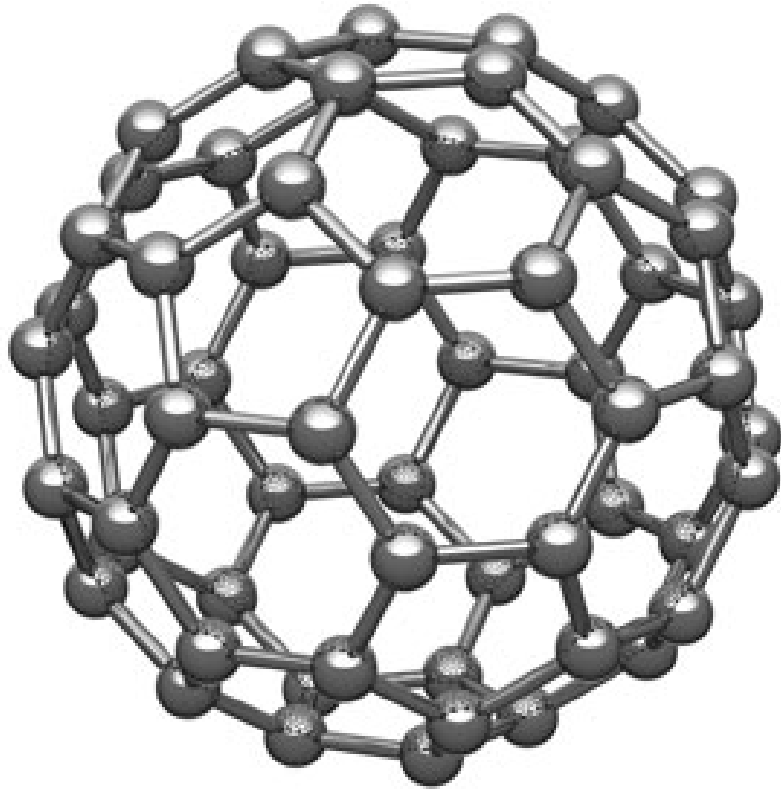
NANOISATION OF CRYSTALLINE METALS



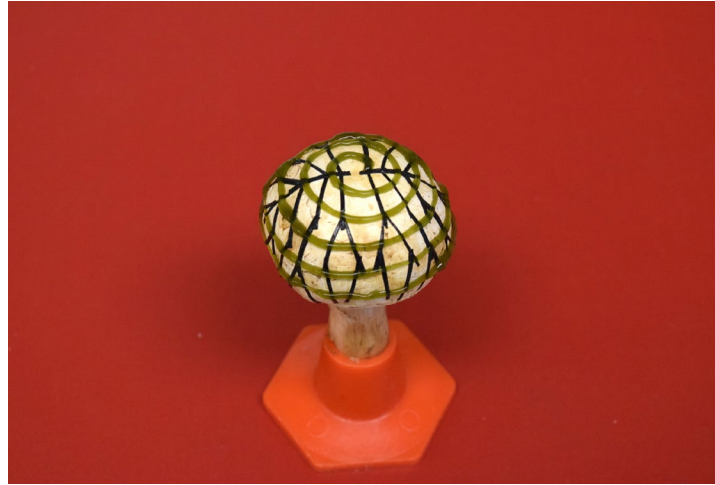
Tuning of photocatalytic activity of titanium dioxide with silver nanoparticles

Antibiotic activity of silver doped titanium dioxide nanotubules

CARBON NANOMATERIALS

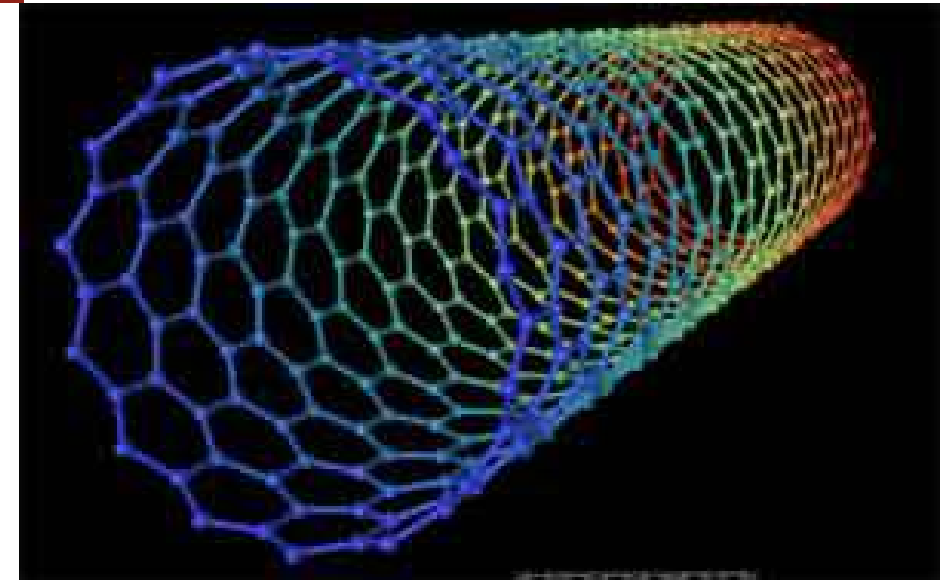


Buckyball C60



Carbon nanotubes-
sheets of graphene

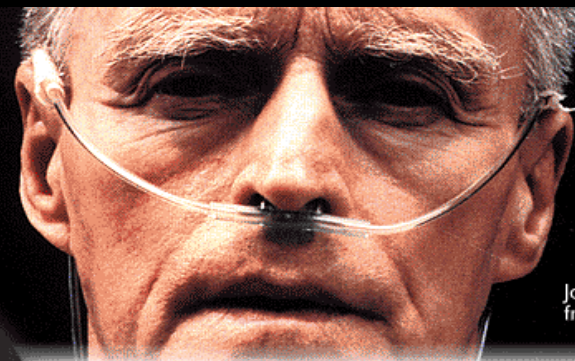
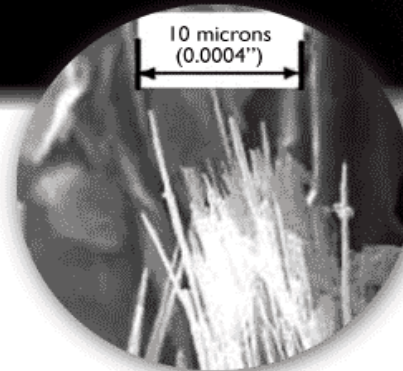
White button mushroom
equipped with 3D- printed
graphene nanoribbons which
collect electricity generated by
densely packed 3D-printed
cyanobacteria



ALICE – A FIGHT FOR LIFE



Asbestos



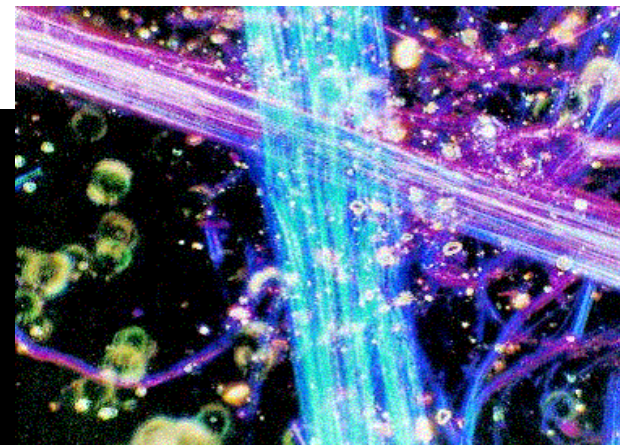
Joe Darabant died from asbestosis in 1990.

You'd think... a substance that kills 10,000 Americans each year would be banned.

You'd think... that Congress would do everything possible to help those afflicted with asbestos diseases.

Think again.

Photograph of Joe Darabant
Copyright Bill Ravanese | [About the photographer](#)



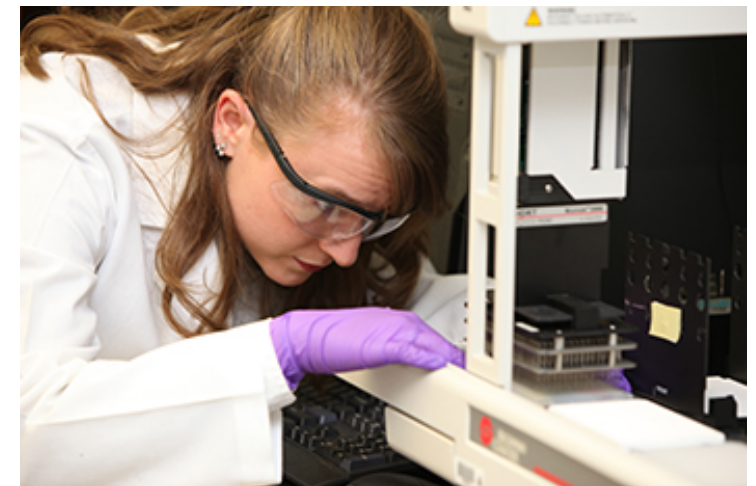
PRECAUTIONARY PRINCIPLE TOXICITY TESTING & FORECASTING



Researchers are identifying and characterizing the unique chemical and physical features of nanomaterials, such as size, shape, chemical composition, stability, etc.

to determine which nanomaterials may pose a higher probability of risk and those expected to have little impact

US EPA Toxicity
Forecaster



COMBINED PRODUCT TESTING

Safer drinking water – nano-encapsulated membranes
for water purification

Transparent Surgical Masks

Pixel based light detection

Sunscreens

