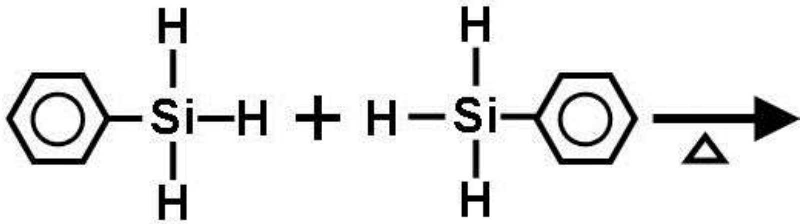
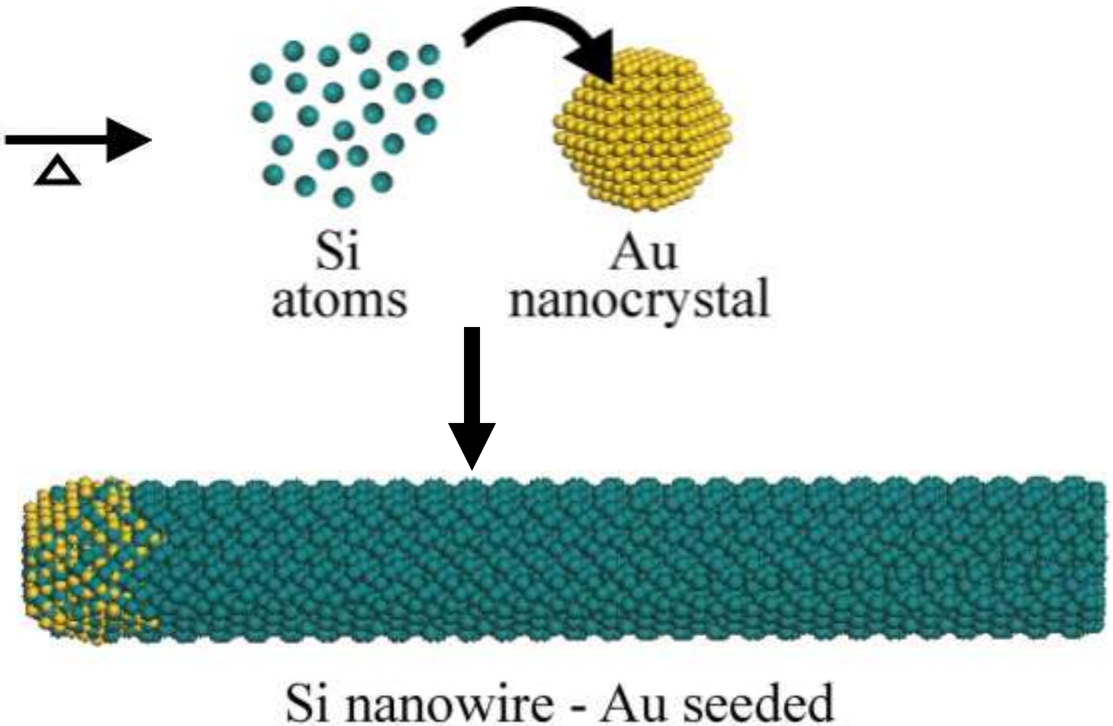
The Korgel Group: Nano

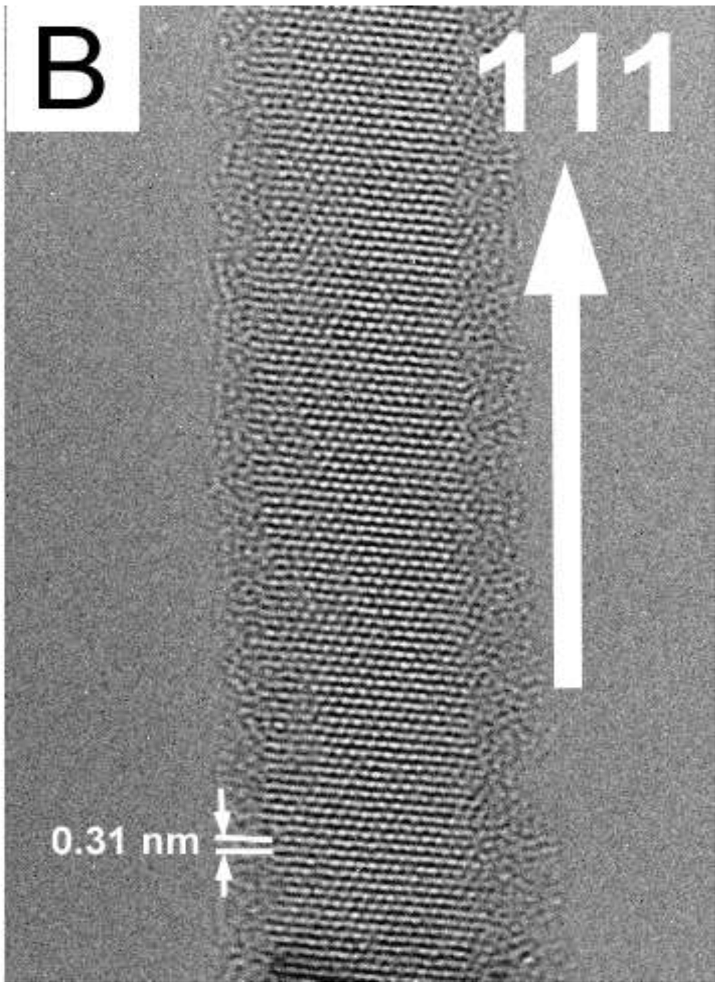
Brian A. Korgel
korgel@che.utexas.edu

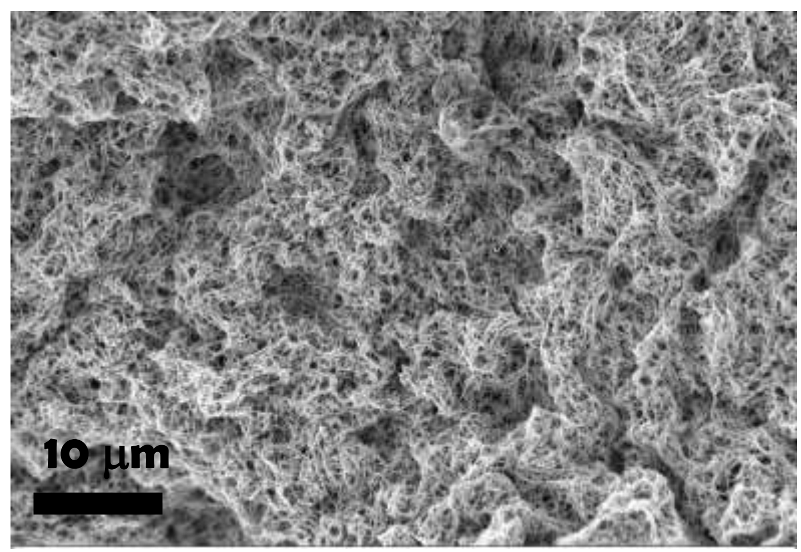
- Funding from NSF, the Welch Foundation, NIH, DOE, DARPA, ONR, AFOSR, the Texas Higher Education Coordinating Board, and the Advanced Materials Research Center in collaboration with International SEMATECH for financial support

Semiconductor nanowires: a product of chemistry





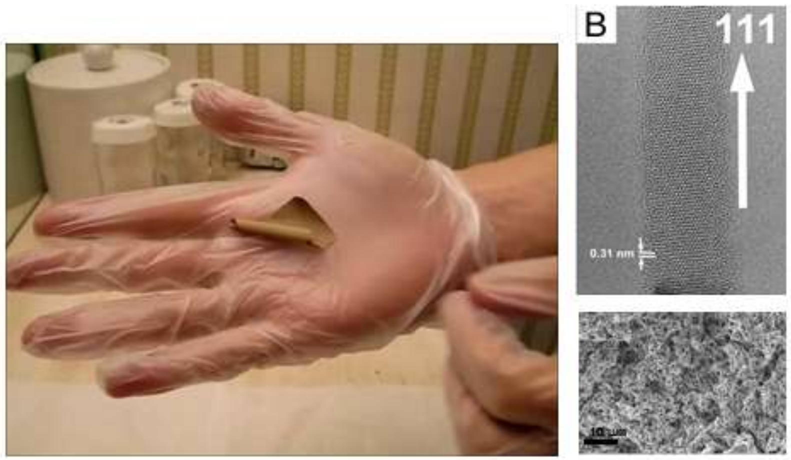




Semiconductor Nanowire Applications

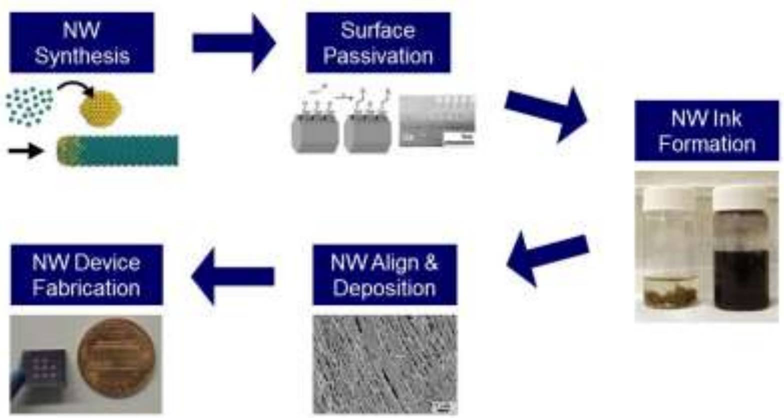
A New Materials Platform

Non-woven Si nanowire fabric

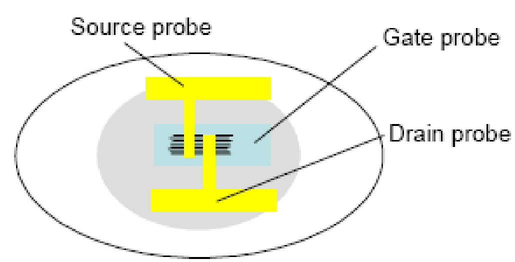


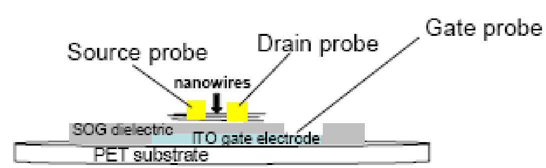
A new material for textiles applications, lithium ion batteries, photovoltaics

Nanowire Thin Film Transistors



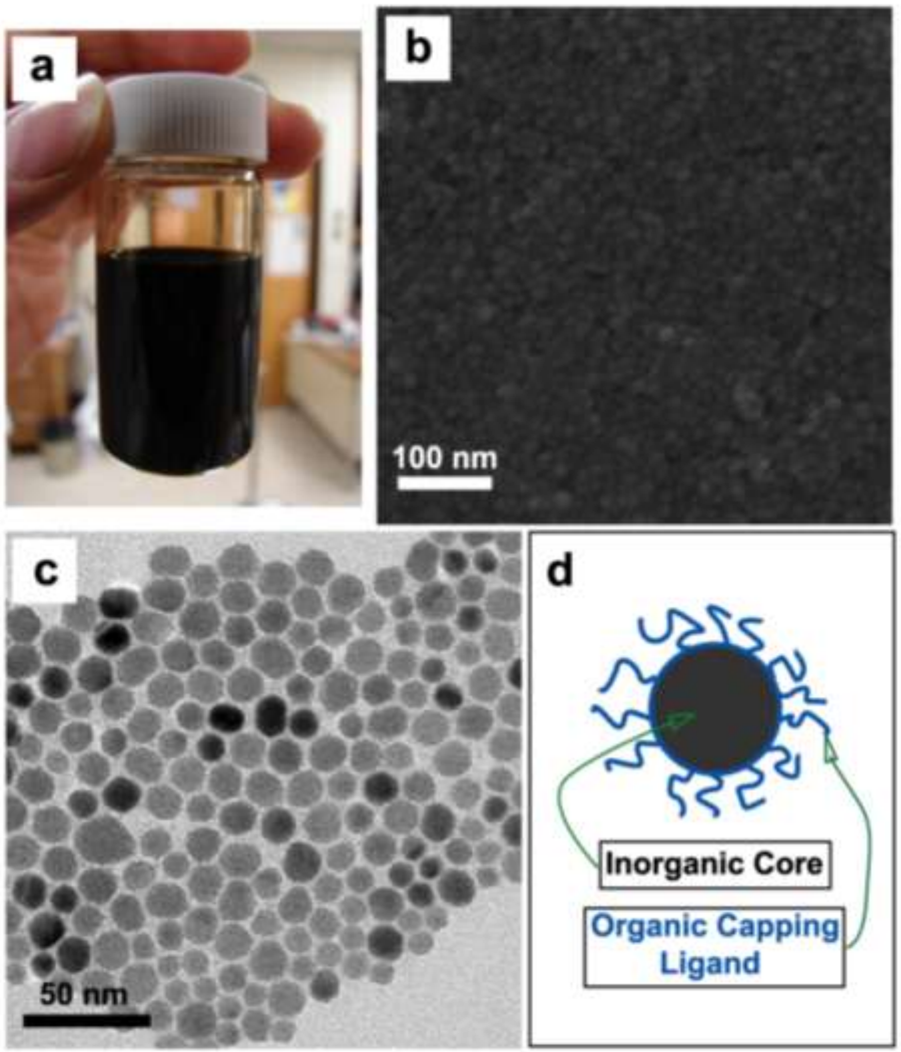
Advanced, printable electronics based on semiconductor nanowires made in high throughput manufacturing scheme.





Semiconductor Nanocrystal Inks for Photovoltaics

Goal: Low cost high efficiency PVs



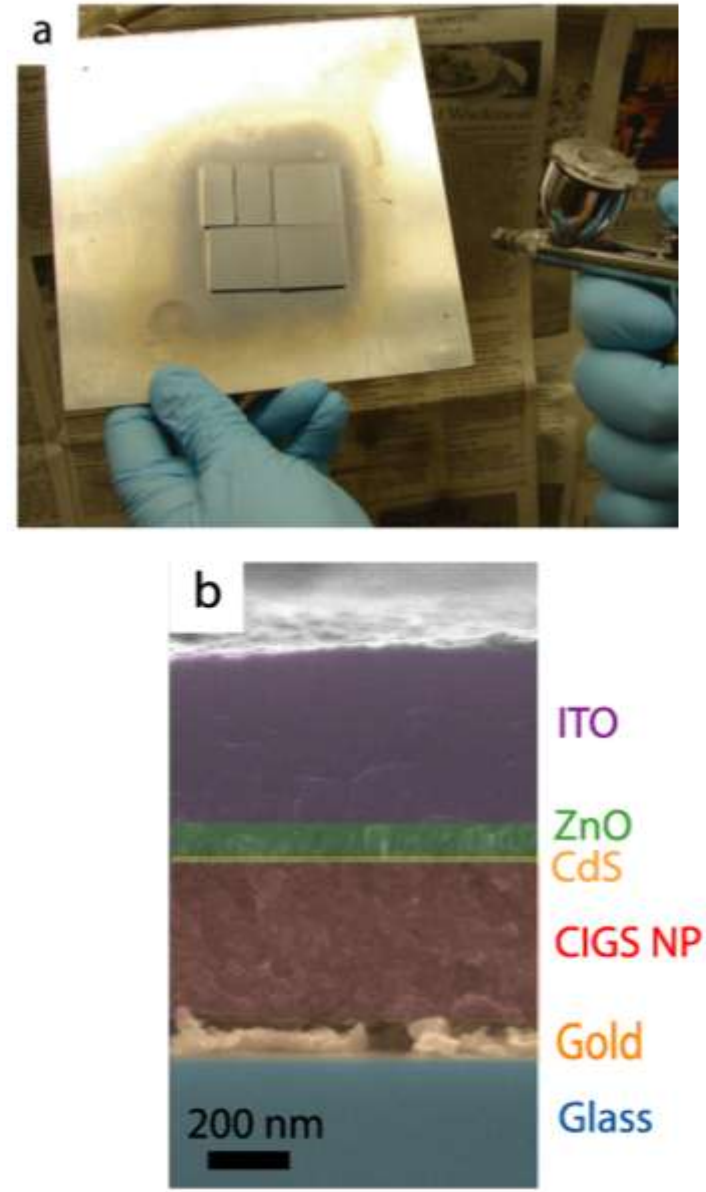



Image 12 of 25 Courtesy University of Texas Cockrell School of Engineering

Reader's Digest .com

25 Inventions That Will Improve Your Life

12. Spray-On Solar Panels

While solar panels are hot with homeowners for warming the house and saving electricity, they're often rejected as costly and tricky to install. Now engineers are racing to make a more consumer-friendly version. One attractive candidate is solar ink. Applied with a spray gun, the ink allows builders and homeowners to turn windows, doors, and roofs into power-generating panels. Just spray it on the way you would on a model airplane, says Brian Korgel, the University of Texas at Austin chemical engineering professor who invented the technology. (The ink can also be printed on plastic sheets using an ink-jet-type printer.) He expects the ink to be available in three to five years.

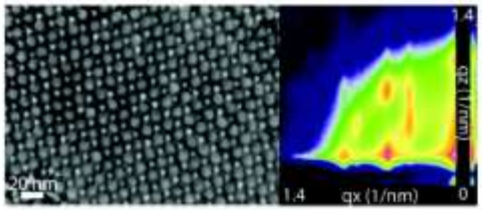
JOURNAL OF THE AMERICAN CHEMICAL SOCIETY

Article

Self-Assembled Simple Hexagonal AB Binary Nanocrystal Superlattices: SEM, GISAXS, and Defects

Danielle K. Smith, Brian Goodfellow, Detlef-M. Smilgies, and Brian A. Korgel

J. Am. Chem. Soc., **Article ASAP** • DOI: 10.1021/ja8085438 • Publication Date (Web): 13 February 2009



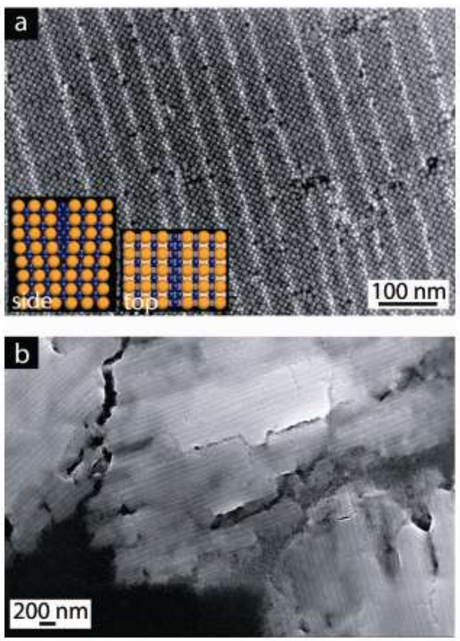
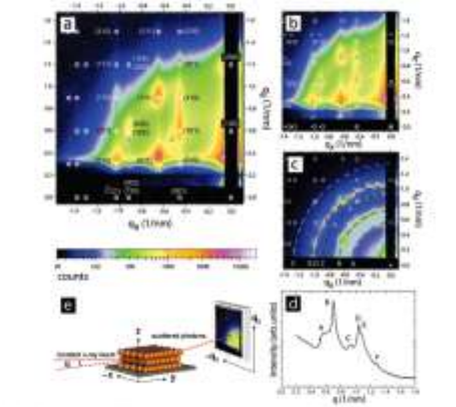
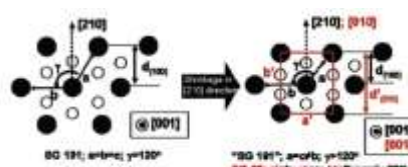


Figure 5. SEM images of superlattice dislocations: nearly periodic bright stripes are observed in these sh-AB_2 BSLs of 11.5 nm Fe_2O_3 and 6.1 nm Au nanocrystals oriented with (100) planes parallel to the substrate. The bright stripes are Au nanocrystal half-planes (dislocations) inserted into the lattice as illustrated in the inset in (a) as viewed from the side (looking at the (1−20) plane down the [010] axis) and from the top (looking at the (100) plane or down the [210] axis as viewed in the SEM images); the blue and orange spheres represent Au and Fe_2O_3 nanocrystals, respectively.





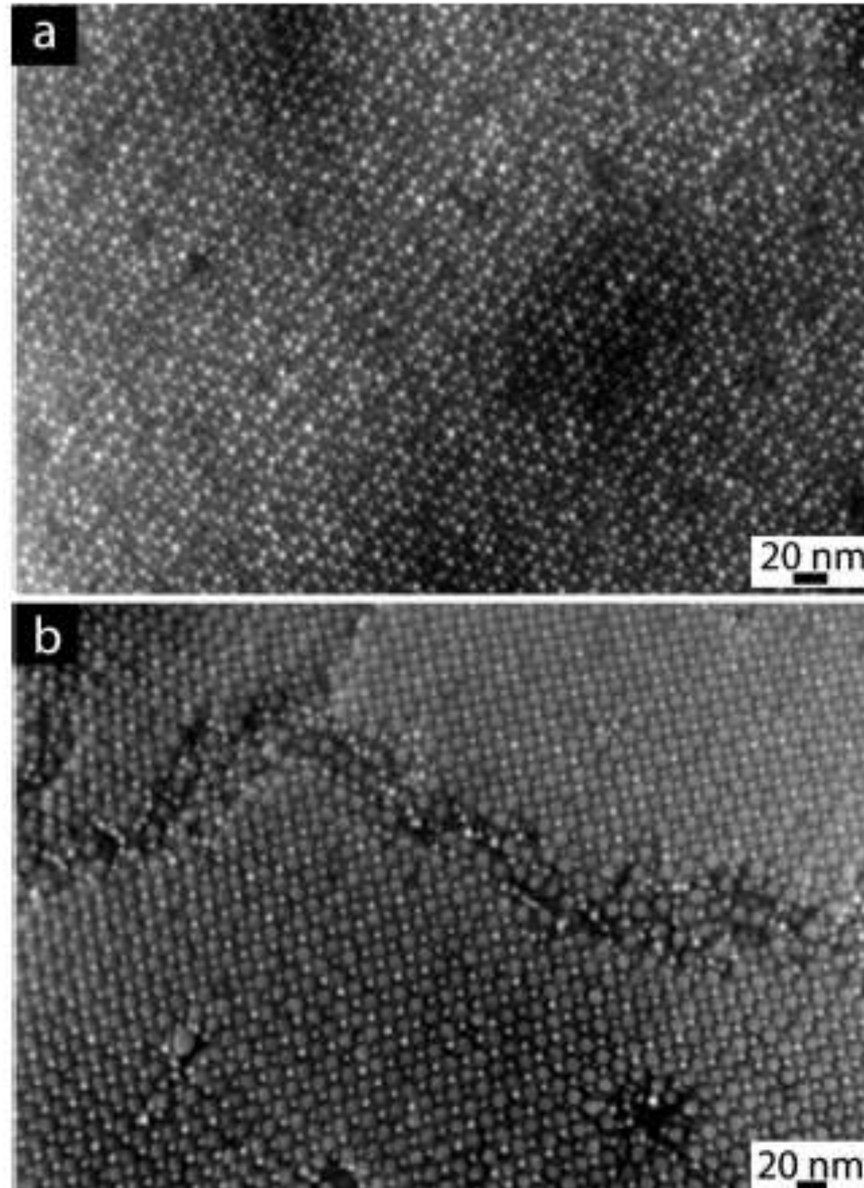
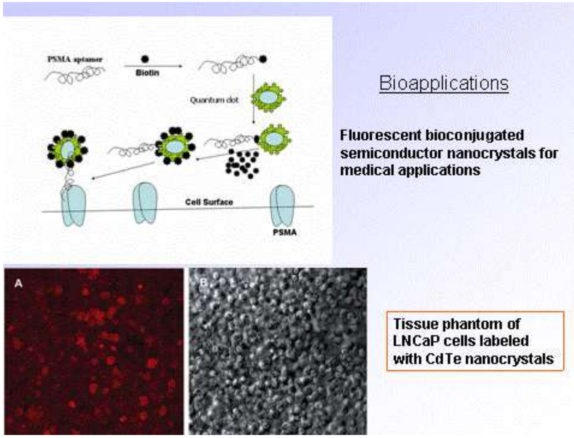
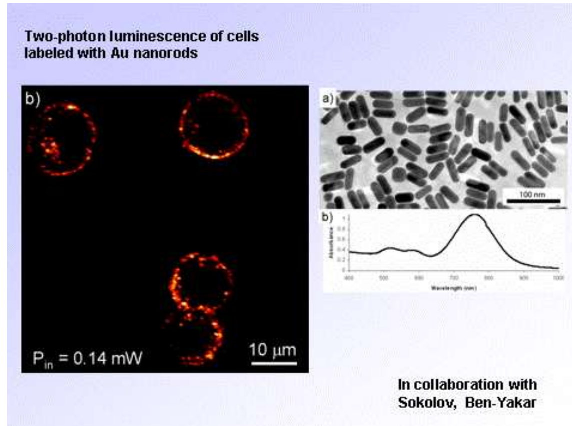


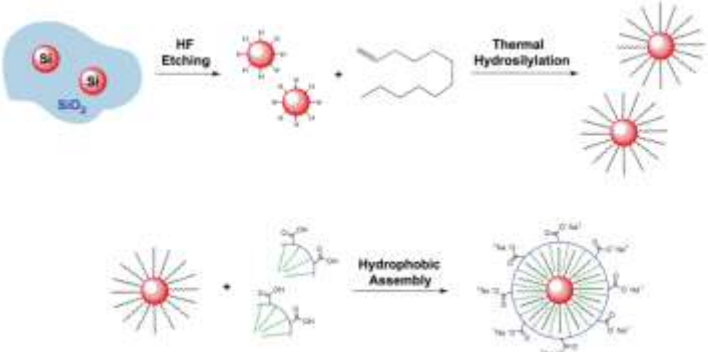
Figure 1. HRSEM images of sh-AB_2 BSLs on Si_3N_4-coated Si substrates with two different exposed BSL crystallographic surfaces: (a) (001) and (b) (100). Crystalline domains up to ~9 μm in diameter were observed. Selected area electron diffraction (SAED) verified the presence of both Au and Fe_2O_3 nanocrystals in the BSLs (Figure S2 in Supporting Information).

NanoBio: Targeted imaging, photothermal therapy



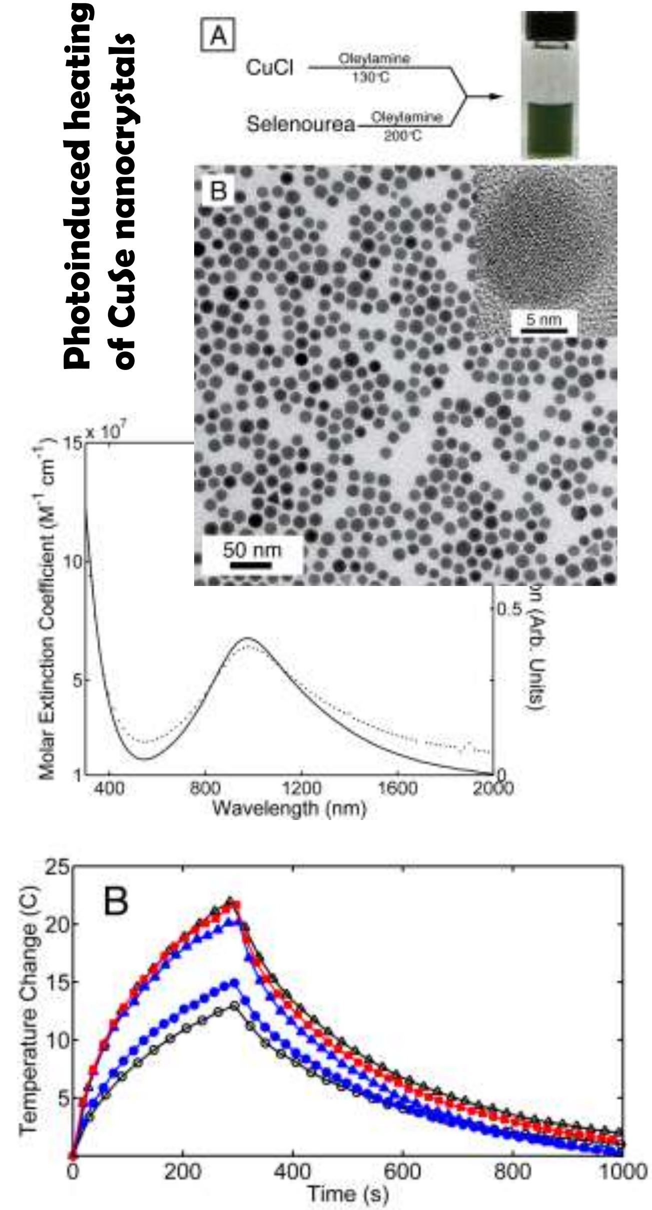


Nanocrystals engineered with molecular recognition



Luminescent biocompatible silicon nanocrystals

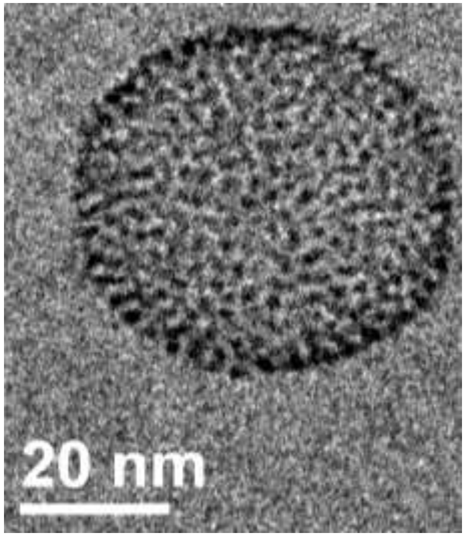
Photoinduced heating of CuSe nanocrystals



Nanocrystals in Liposome (Vesicle) hosts

Questions: will hydrophobic nanocrystals embed in the vesicle membrane without disrupting its structure?

Is there a nanocrystal size limitation? (Membrane thickness is 3.7 nm)



Cryo-TEM image of a PC liposome loaded with Au nanocrystals

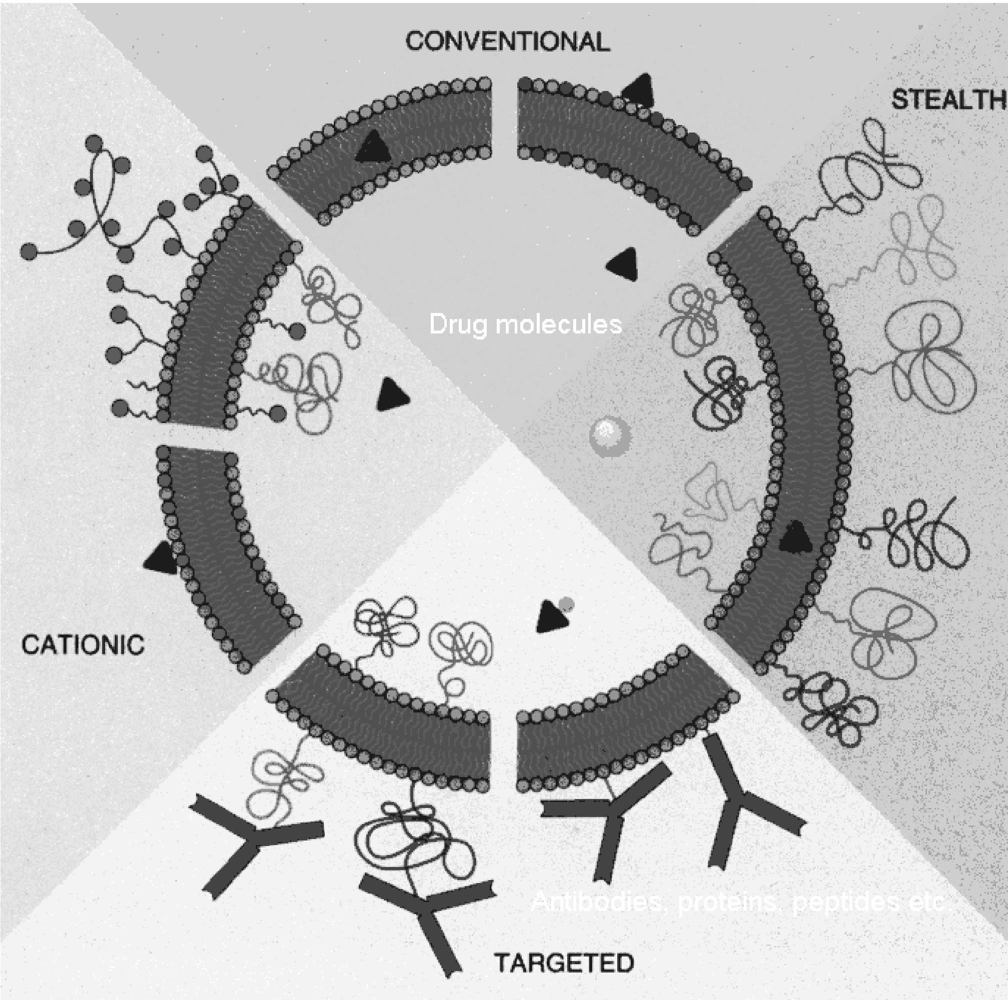


Image from: http://www.uzh.ch/onkwww/images/lipos4.gif