



***GREEN NANOTECHNOLOGY IN DUAL MEDICAL and
NATIONAL DEFENSE APPLICATIONS
Global Perspectives On Formal Training and Education***

Kattesh V. Katti

Professor of Radiology and Physics

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Platform*

University of Missouri-Columbia

Bioterrorism & Complex Systems Workshop April 13, 2011



Globally Recognized Efforts In Nanomedicine



➤ Chancellor Brady Deaton (2008)

- Raghuraman Kannan
- Kattesh V. Katti
- Handy Williamson
- Ann Deaton
- Kavita Katti

➤ Dean Robert Churchill (2010)

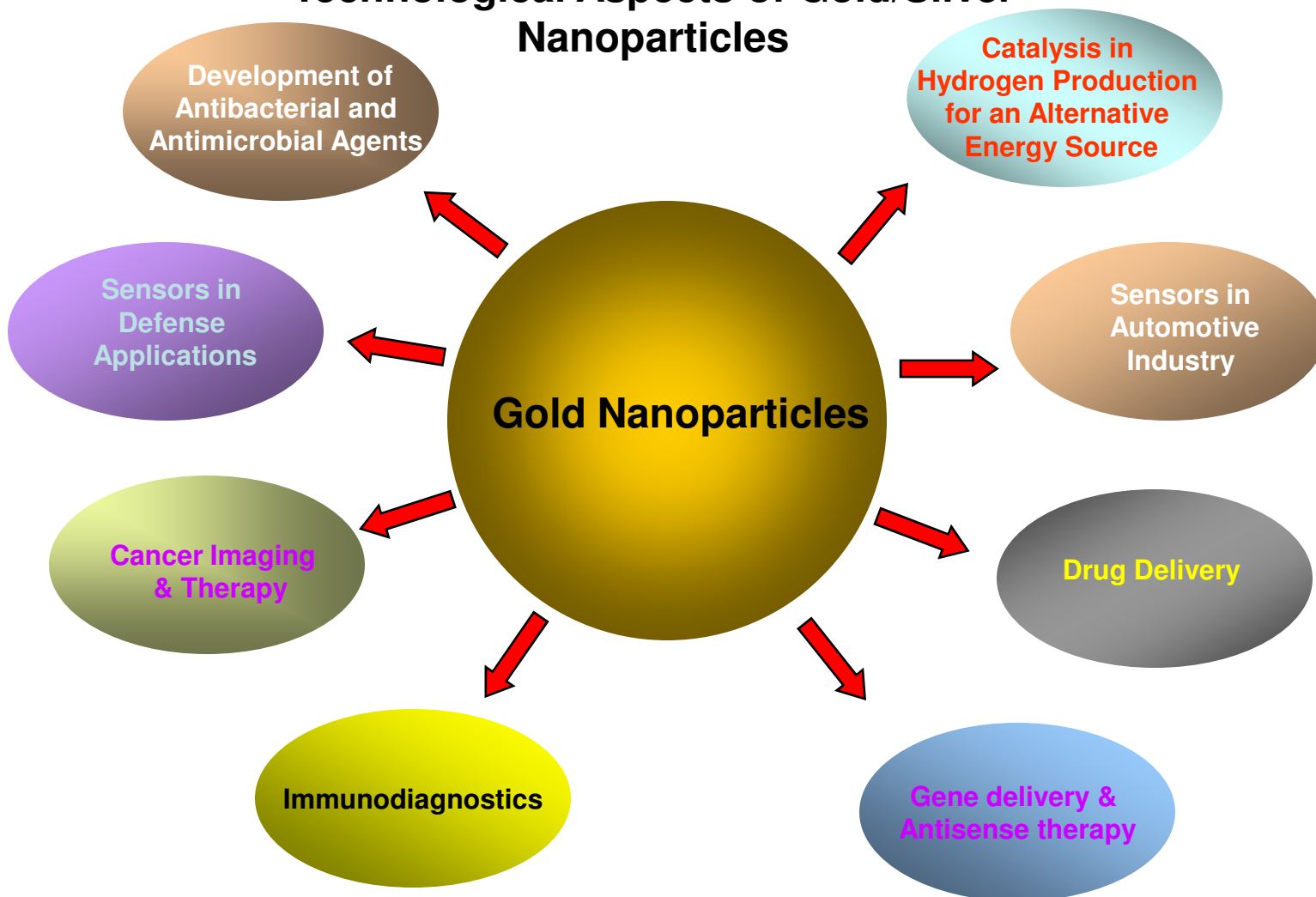
- Kattesh V. Katti
- Raghuraman Kannan
- Robert Duncan (May 2011)
- Annette Sobel (May 2011)

Signed MOU's with five academic and two industrial corporations

- Research
- Education
- Product Development

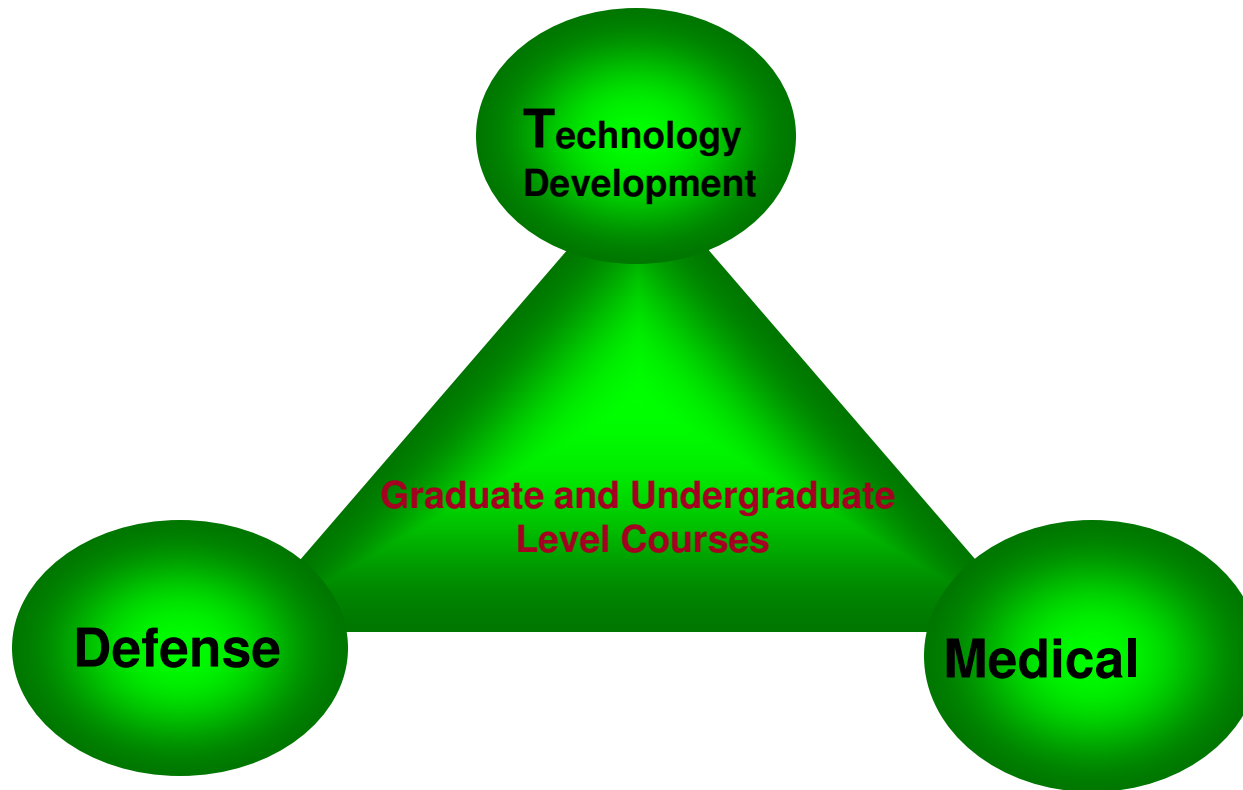


Formal Training On The Scientific and Technological Aspects of Gold/Silver Nanoparticles





Green Nanotechnology: In Medicine and Stealth Sensor Design

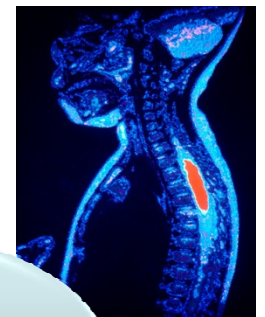




Training In Biomedical and Global Defense ↔ Nanotechnology



Medicine



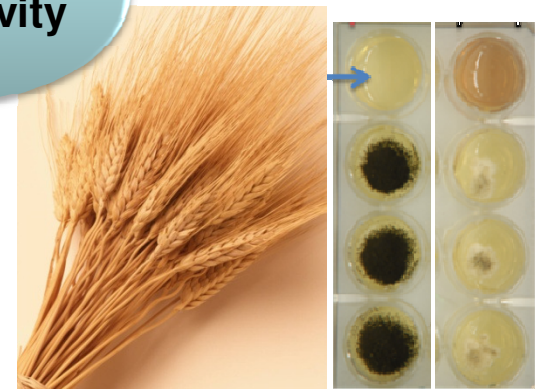
Environmental Restoration

Green Nano-technology

Alternative Energy

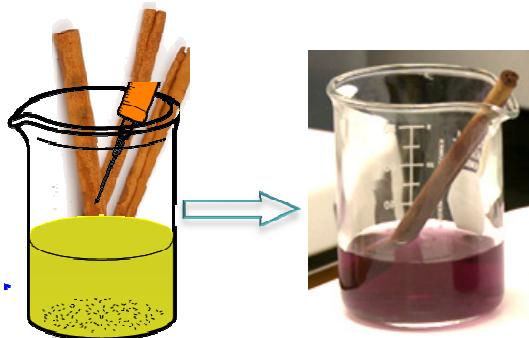


Agriculture Productivity



Nontoxic Nanotech Uses Cinnamon

By Alyssa Danigelis | Thu Dec 2, 2010 05:09 PM ET



A dash of spice makes everything nice, including nanotechnology. Scientists at the University of Missouri have a way to make gold nanoparticles using cinnamon instead of toxic chemicals.

Nanotech has all kinds of potential, including as a tool to fight cancer. Small particles -- ones that are much, much smaller than a human cell -- can do what chemicals can't. Gold, in combination with active chemicals, turns out to be ideal for targeted cancer treatment and detection. The problem is that making gold nanoparticles involves toxic chemicals.

A University of Missouri team led by radiology and physics professor **Kattesh Katti** developed a **greener alternative**. The researchers took cinnamon, mixed it with gold salts in water and successfully produced gold nanoparticles. Sounds kind of like alchemy at first glance, but the scientists found that cinnamon and other kinds of plants contain naturally occurring chemical compounds called phytochemicals.



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Gold Nanoparticles Like Cinnamon - Jury Still Out On Pepper

by Doug Bonderud

NanoPartz - Gold Nanoparticles - Nanorods - Nanowires - Custom Conjugations
www.nanoPartz.com



Ads by Google

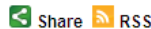
Scientists at the University of Missouri have discovered a way to create **gold** nanoparticles using only a tasty and powerful kitchen spice - cinnamon.

As nanotechnology evolves, so too does the need for a green alternative for the production of things like gold nanoparticles, which can be used to treat cancer and are found in both consumer electronics and pharmaceuticals. The "standard" method for making gold nanoparticles involves the use of acids and toxic chemicals, many of which have immediate and leave behind unhealthy residues in the environment. Through the



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Articles



MU Scientists Find Cinnamon Can Replace Harmful Chemicals Used To Create Nanoparticles

December 3, 2010

Gold nanoparticles, tiny pieces of gold so small that they can't be seen by the naked eye, are used in electronics, healthcare products and as pharmaceuticals to fight cancer. Despite their positive uses, the process to make the nanoparticles requires dangerous and extremely toxic chemicals. While the nanotechnology industry is expected to produce large quantities of nanoparticles in the near future, researchers have been worried about the environmental impact of the global nanotechnological revolution.



MU scientist Kattesh Katti and his team have found a method that could replace nearly all of the toxic chemicals required to make gold nanoparticles.

Cinammon Makes Nanotechnology Greener

Reported by : Jessica Holley Posted by : Stephanie Stouffer



<http://www.komu.com/KOMU/d7e2017e-869e-16b5-861e-0004d8d229cb/e69cb2ad-80ce-18b5-01a6-01bde12da8e5.html>



Pharm Res

DOI 10.1007/s11095-010-0276-6

RESEARCH PAPER

An Effective Strategy for the Synthesis of Biocompatible Gold Nanoparticles Using Cinnamon Phytochemicals for Phantom CT Imaging and Photoacoustic Detection of Cancerous Cells

Nripen Chanda · Ravi Shukla · Ajit Zambre · Swapna Mekapothula · Rajesh R. Kulkarni · Kavita Katti · Kiran Bhattacharyya ·



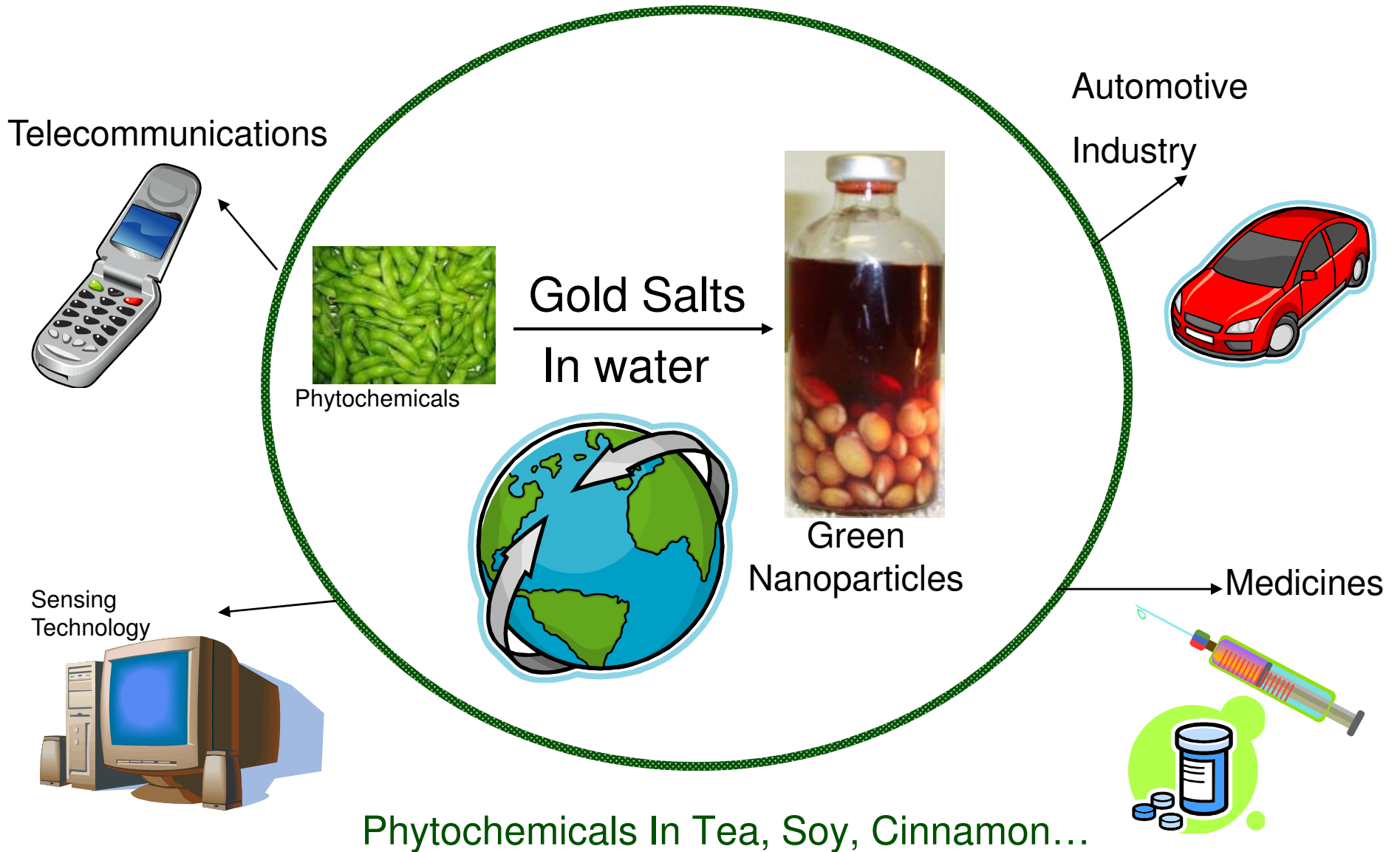
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Cinnamon Could Replace Harsh Chemicals To Produce Gold Nanoparticles, Researchers Say

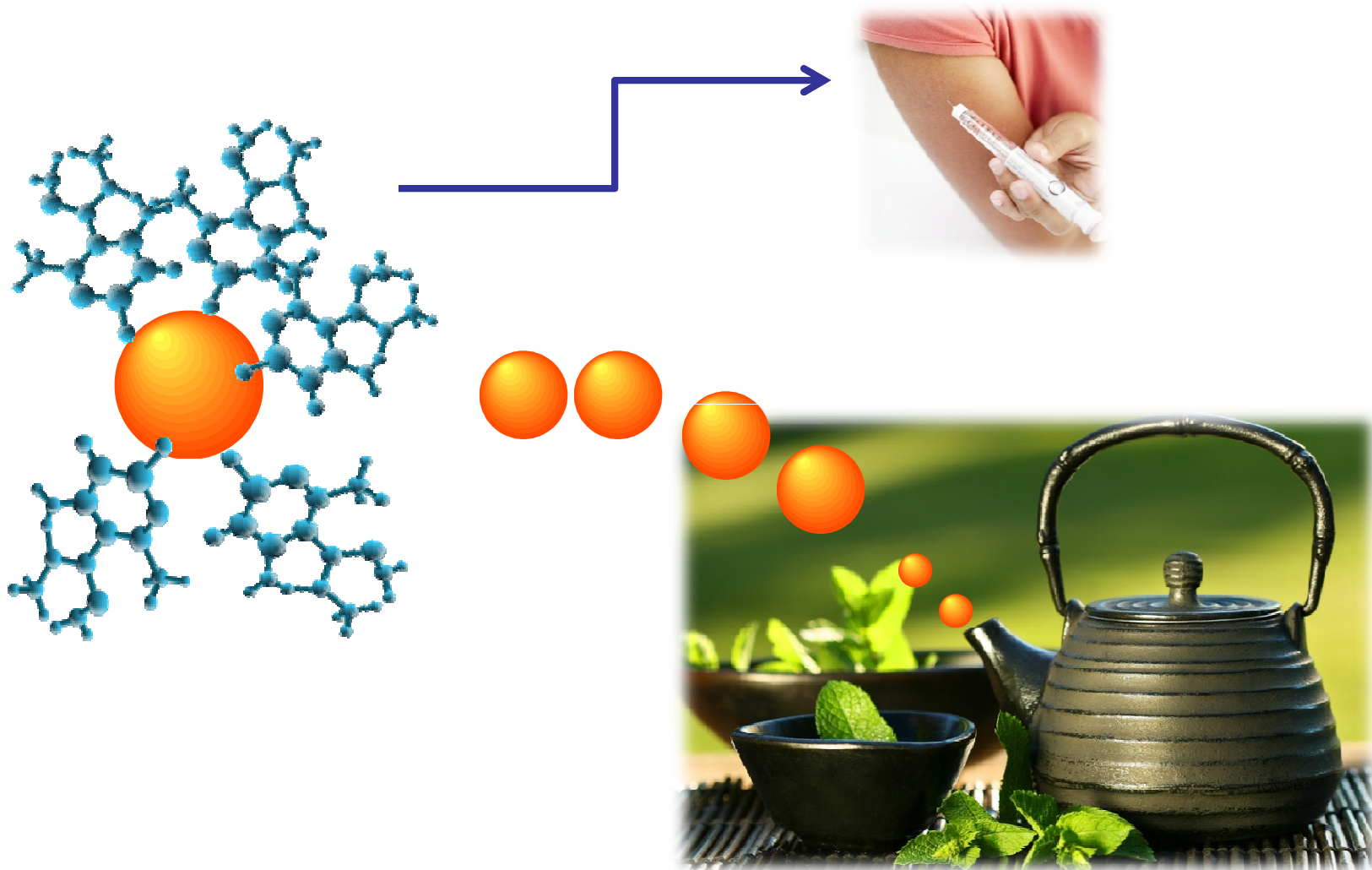
By Rebecca Boyle Posted 11.29.2010 at 4:21 pm 8 Comments



Green Nanoparticles in Civilian and Defense Use

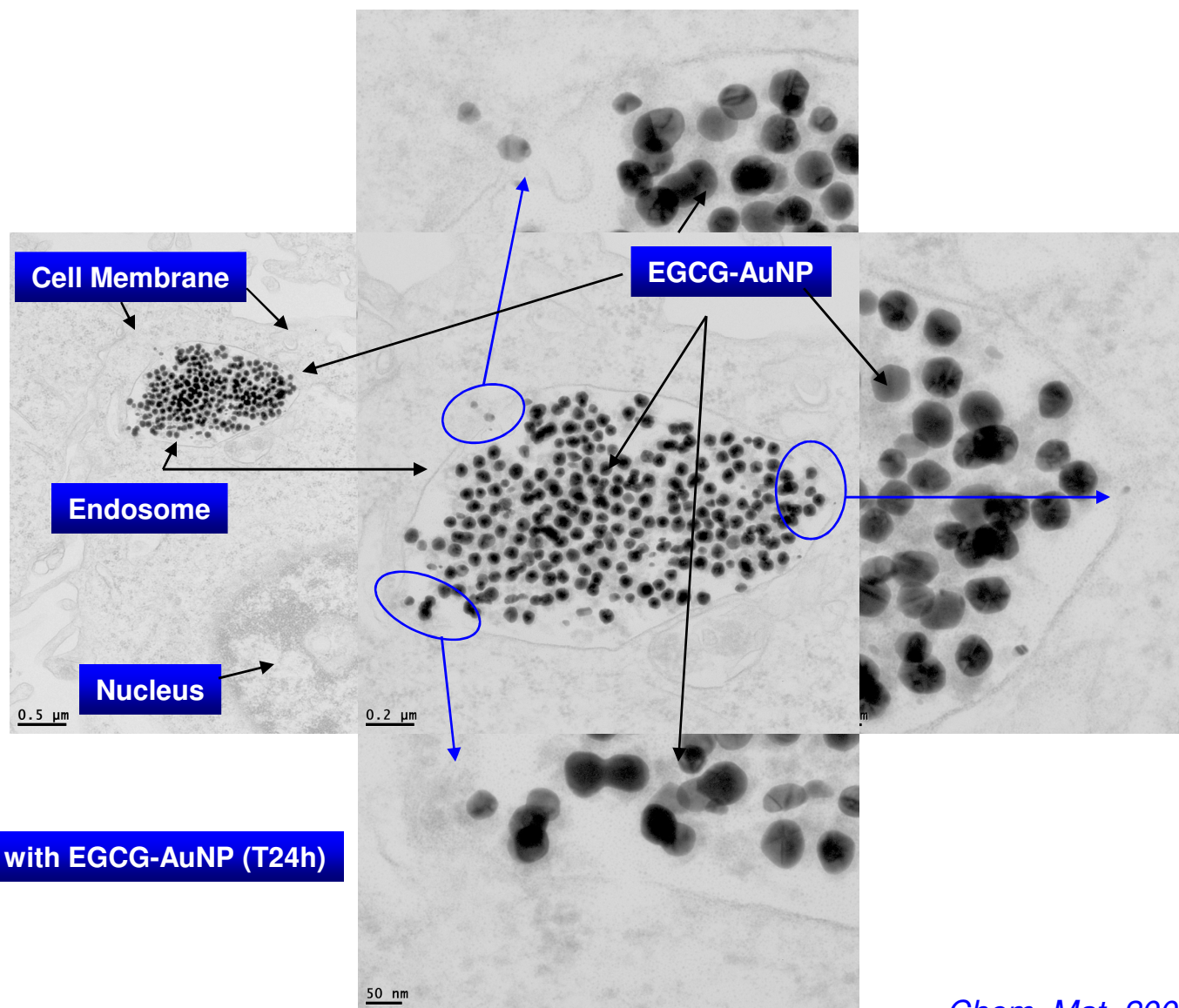


MU's Nanodrug from Tea





EGCG-AuNPs Cellular Internalization

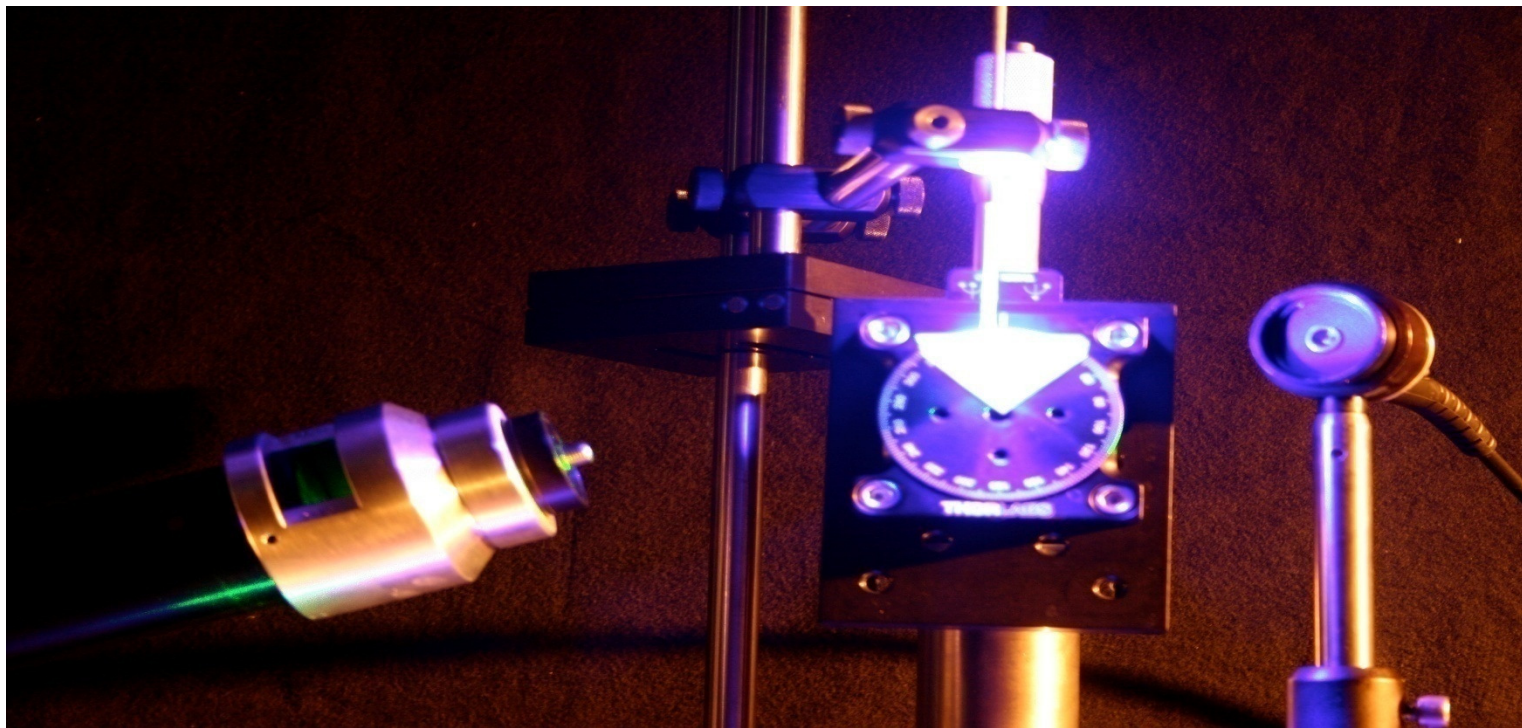


PC-3 Cells with EGCG-AuNP (T24h)



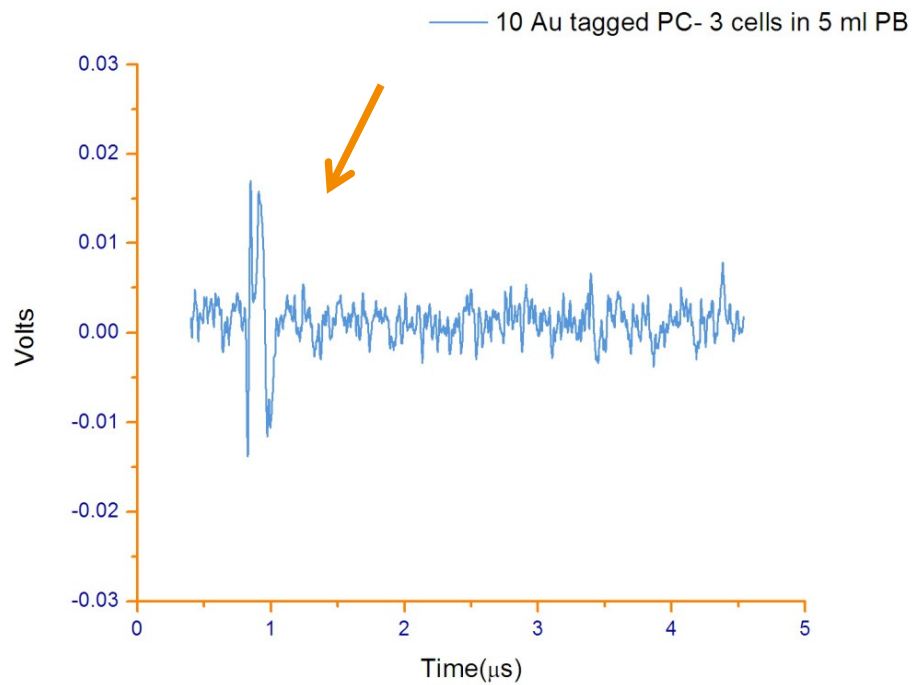
EGCG-AuNPs in PC-3 cells: Photo acoustic studies

Experimental setup

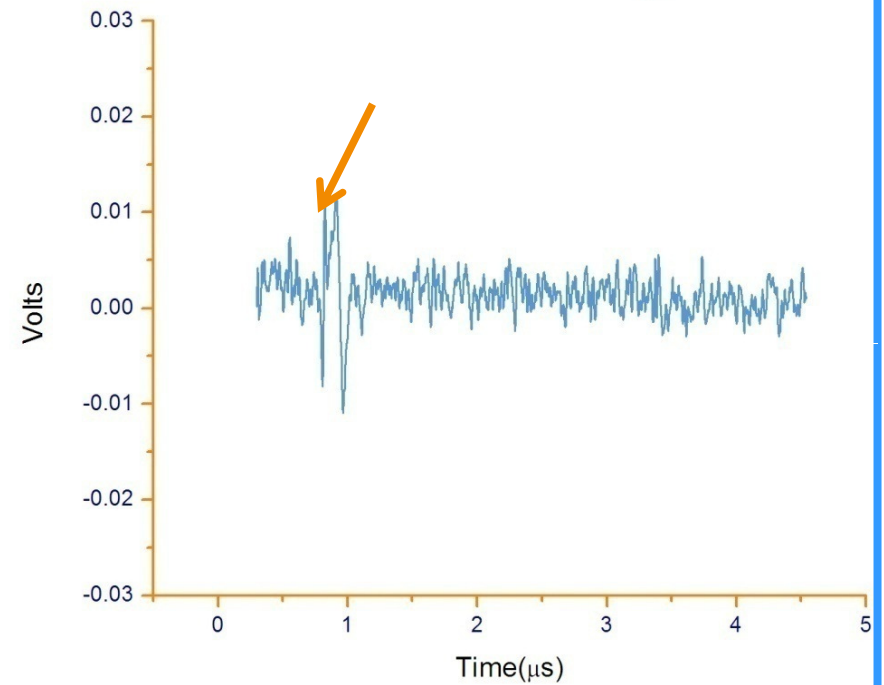




EGCG-AuNPs Treated PC-3 cells: Photo acoustic profile

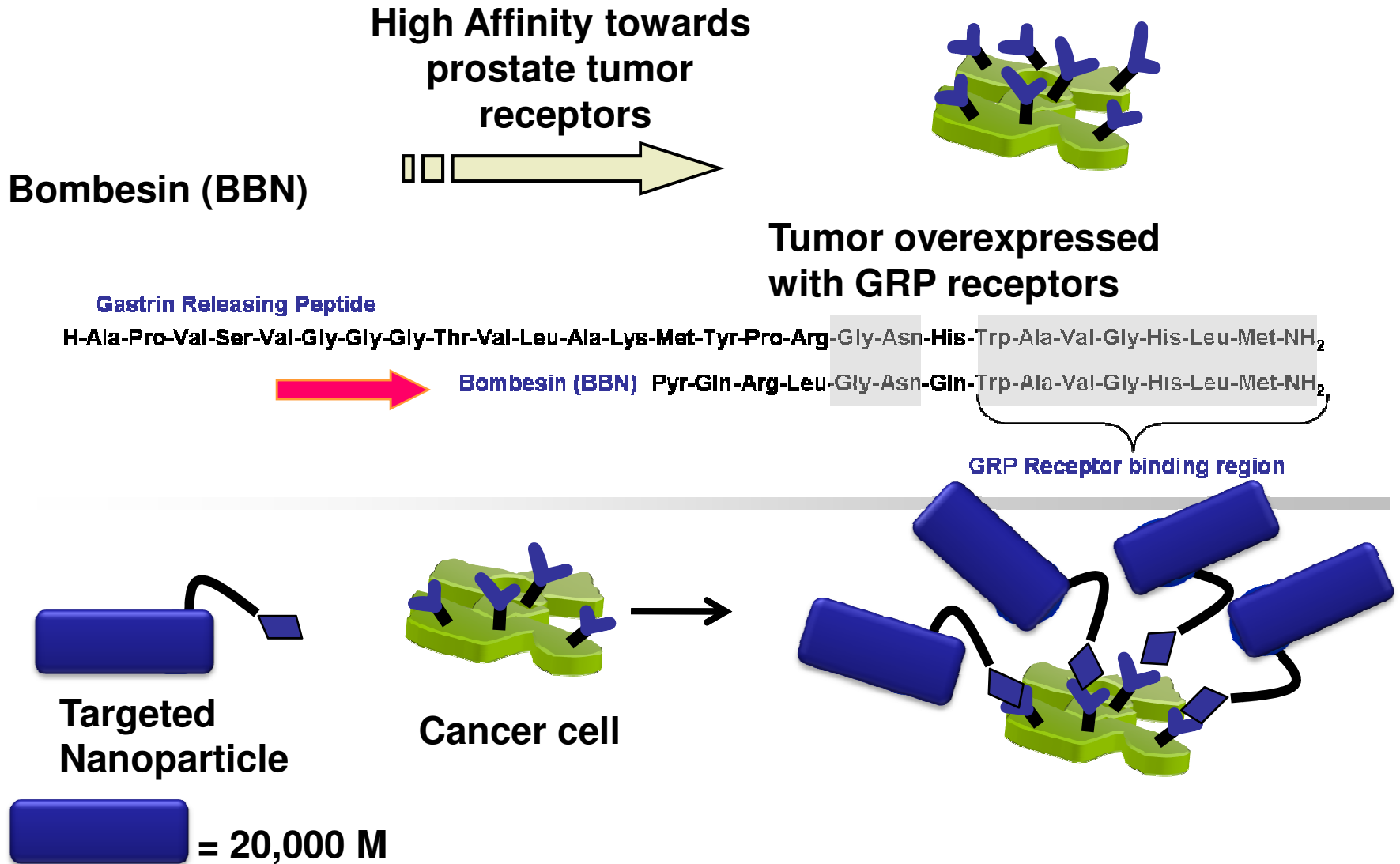


5:24min



6:00min

Targeting receptors..one example





NBI-MU's STEALTH NANOTECHNOLOGICAL PROCESSES FOR DEFENSE APPLICATIONS

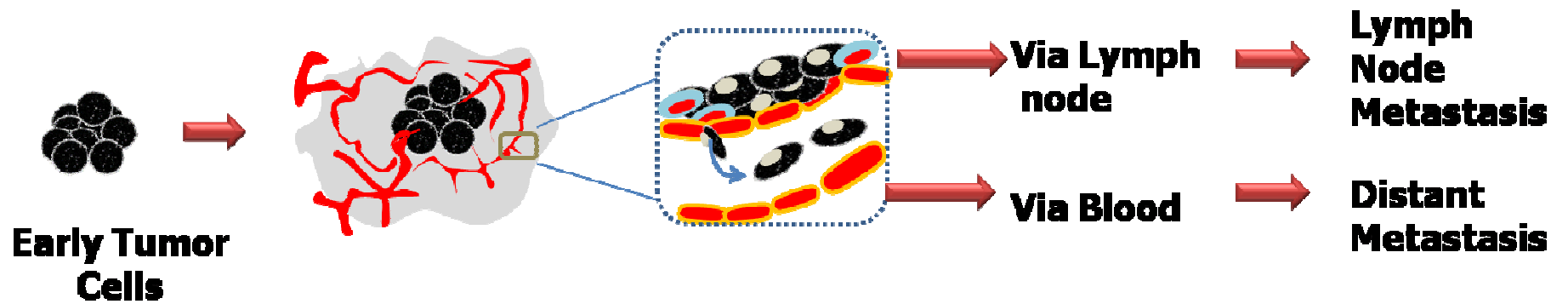
- ❑ Nanolithography that avoids enemy detection
- ❑ Nanoimprinting under stealth conditions
- ❑ Nanoconstruct synthesis leaves no chemical/detectable trail after assembly
- ❑ Ideal for Sensor and Weapons assembly and Tracking under 100% 'Stealth' conditions
- ❑ Education and Formal Training



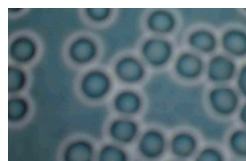
MU and NBIs Antibacterial Nanoconstructs In Defense Applications

- ❑ Non toxic nanoconstructs are effective in 100% destruction of *S. epidermis*, *E. coli*, *S. aureus*, *C. albicans* and various gram + and gram – bacteria
- ❑ Non toxic antibacterial/antimicrobial liquids available in bulk for defense deployment/applications
- ❑ **NEW!!! NBI's** Nanoconstruct product is effective in complete destruction of toxins used in biological warfare (details available in confidential discussions with NBI personnel)

Circulating Tumor Cells

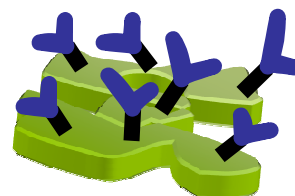
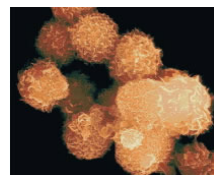


Normal cell Vs Tumor cell



RECEPTOR: 1

GASTRIN RELEASING
RECEPTOR

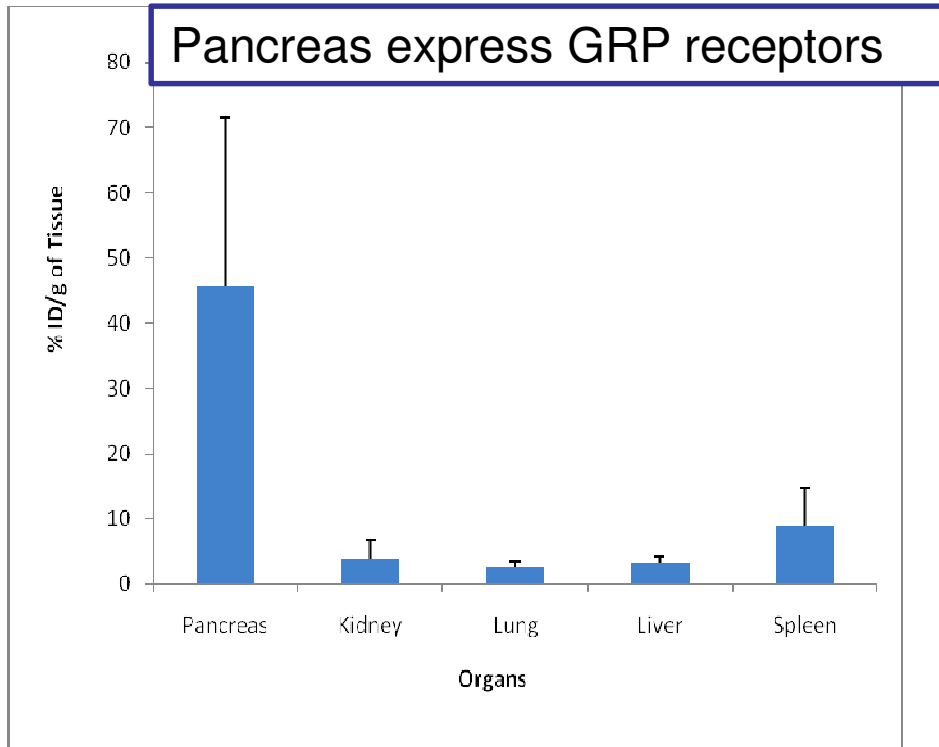
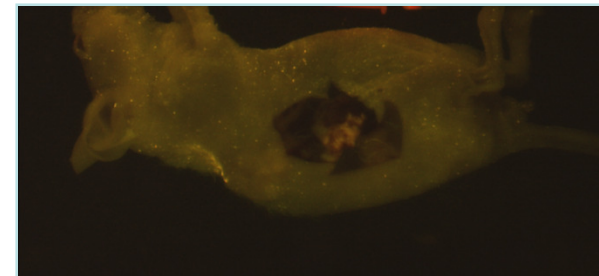
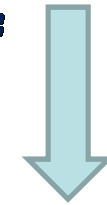
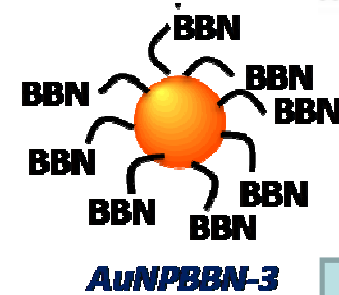


RECEPTORS: 200,000

Targeting receptors..one example



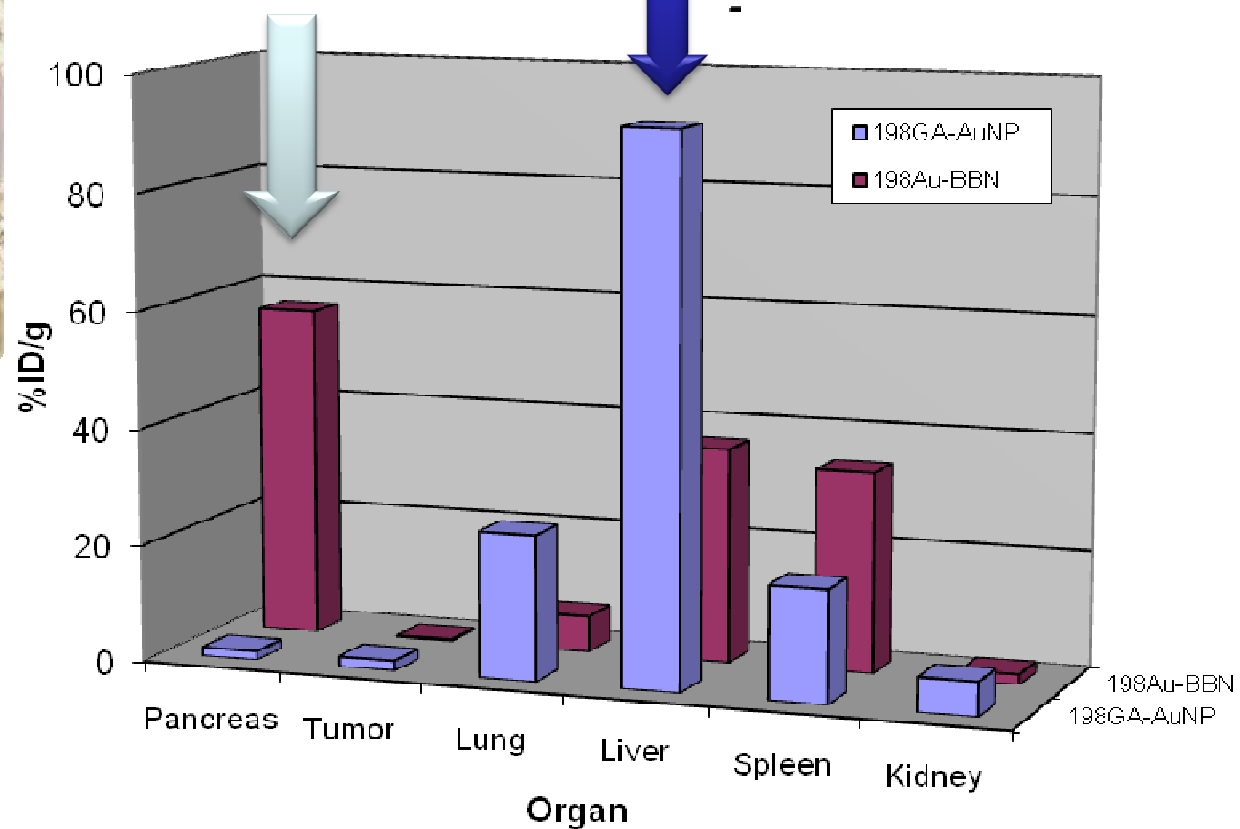
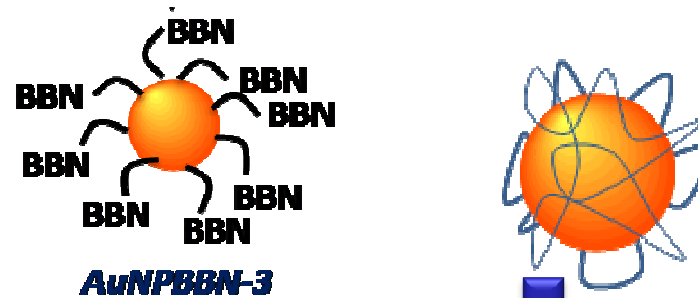
Nanoparticle Biochem, Inc.



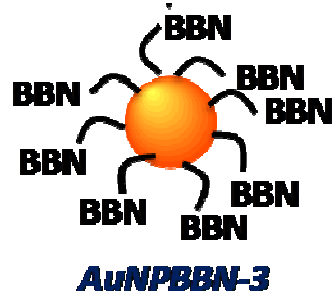
Katti et al PNAS 2010 ; Nano Letters 2010

Targeting receptors..one example

**TUMOR
BEARING
MICE**



Targeting receptors..one example



**TUMOR
BEARING
MICE**

