Editorial Board Member

Dr. Satish K Nune

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Biography

- Dr. Nune is a Research Scientist at Pacific Northwest National Laboratory (PNNL), Richland, WA currently working on the development of new porous materials with very high surface area for sensing, Imaging, delivery, and capture applications. Dr. Nune also teach a course in Nanomaterials at Washington State University (WSU)-Tri-Cities, WA as an adjunct teaching faculty.

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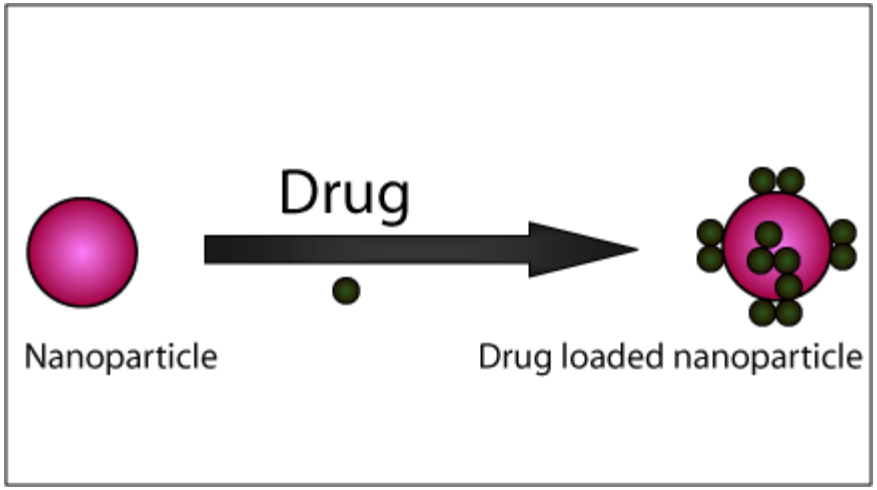
- He has extensive experience in shape selective synthesis and surface functionalization of various materials including polyelectrolyte complex nanoparticles, metal nanoparticles (Au and Pd), nanosized zeolitic imidazolate frameworks (ZIF), and Prussian blue analogues.He also serve as peer reviewer for ACS Nano, Nanoletters, Small, and Chemical Communications.

Research Interests

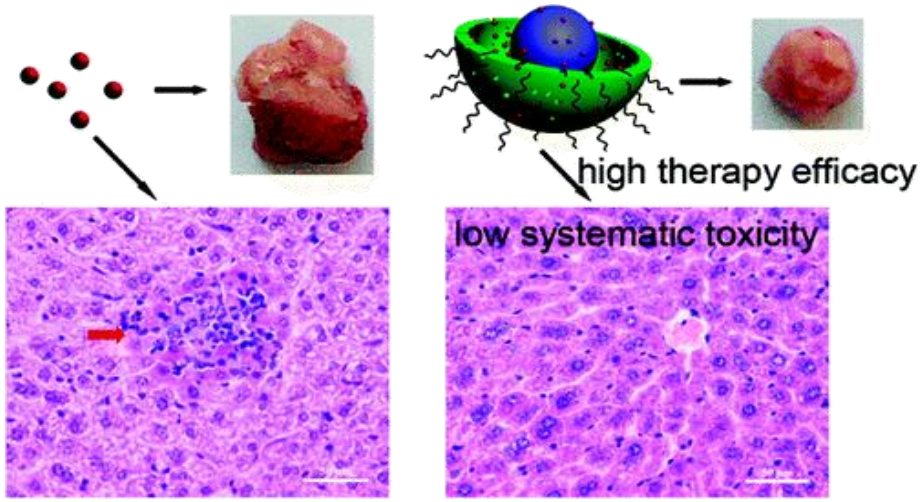
- Nanomaterials/Nanoparticle Synthesis and Fabrication/Nanochemistry safer Nanomaterials for Biomedical Applications

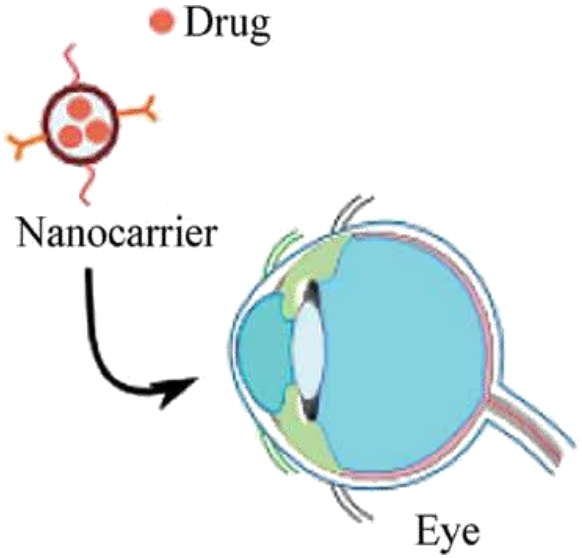
Nanomaterial Drug Delivery



Nanomaterials are the future of drug delivery

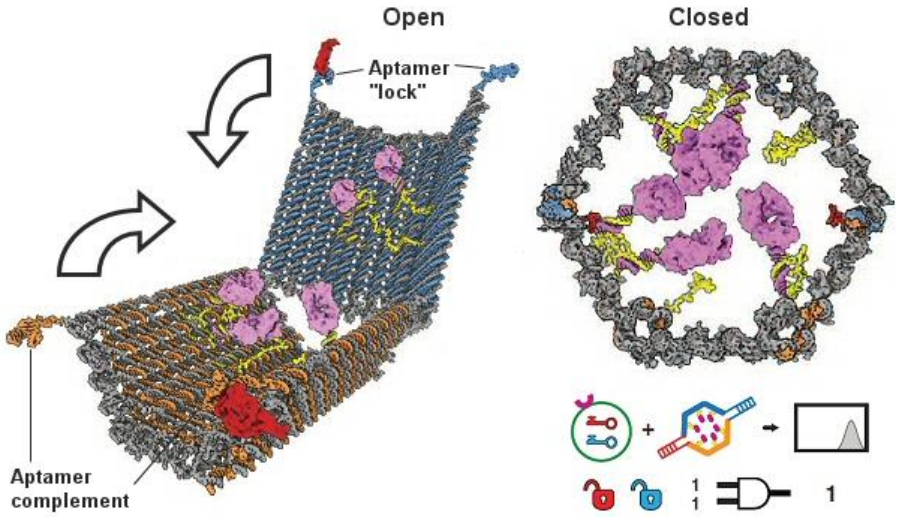
Drugs are able to reach their site of action more effectively

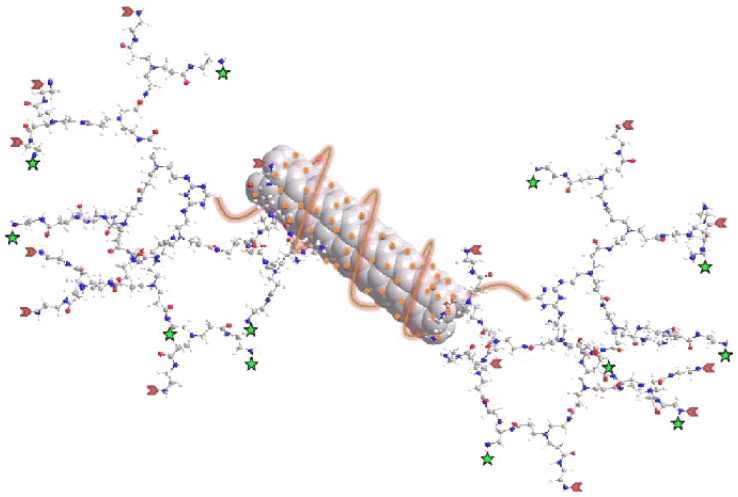




Bodily system barriers are able to be broken with nanocarriers

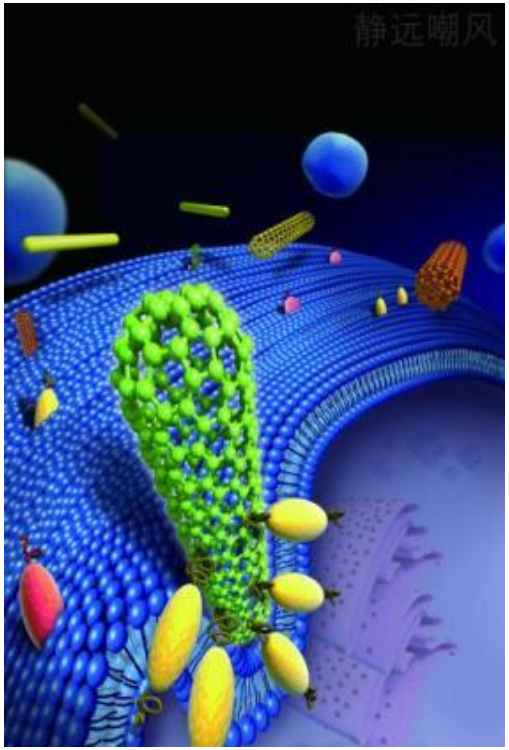
Advanced materials can target various cells, such as cancer cells.





Drugs with different molecular shapes and chemical properties can be synthesized

Different properties results in greater possibilities



Background Information

- All drugs face several transport barriers
  - Plasma membrane
  - The acidic environment of endolysosomes
  - Nuclear membrane
  - Multiple drug resistance mechanism

from their site of introduction to their molecular site of action.

Background Information

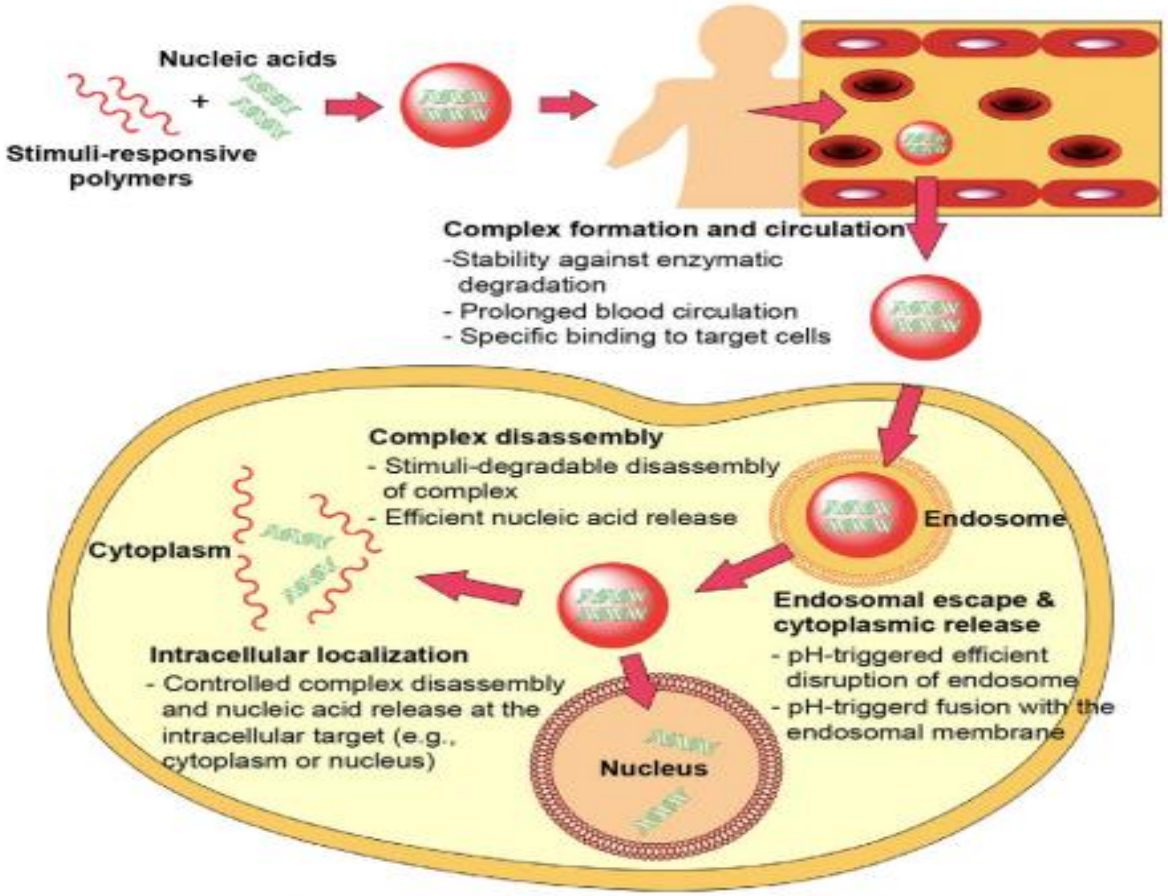
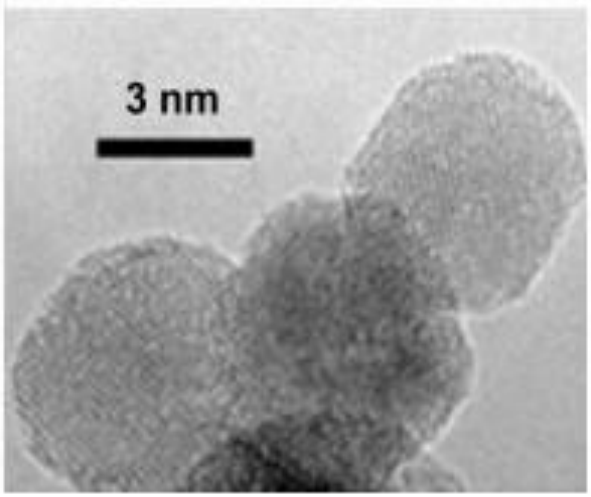


Fig. 1. Various stimuli-responsive approaches to overcoming multi-dimensional (extra- and intracellular) barriers in nonviral gene delivery.

Advantages

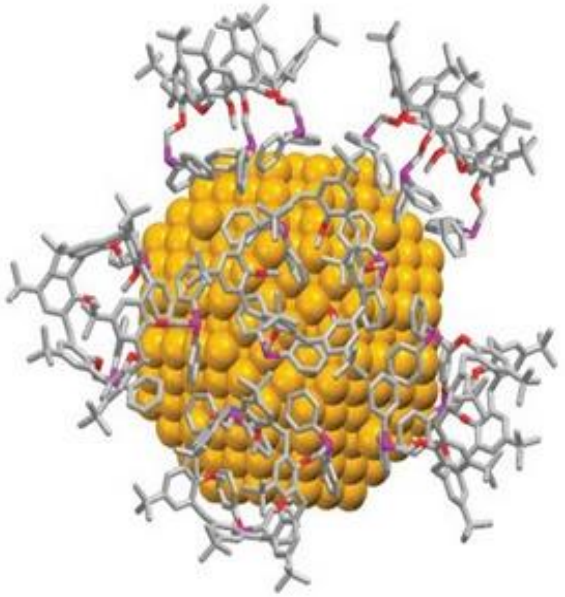
1. Very small size



High-resolution image of detonation nanodiamonds

2. High surface-to-volume ratio

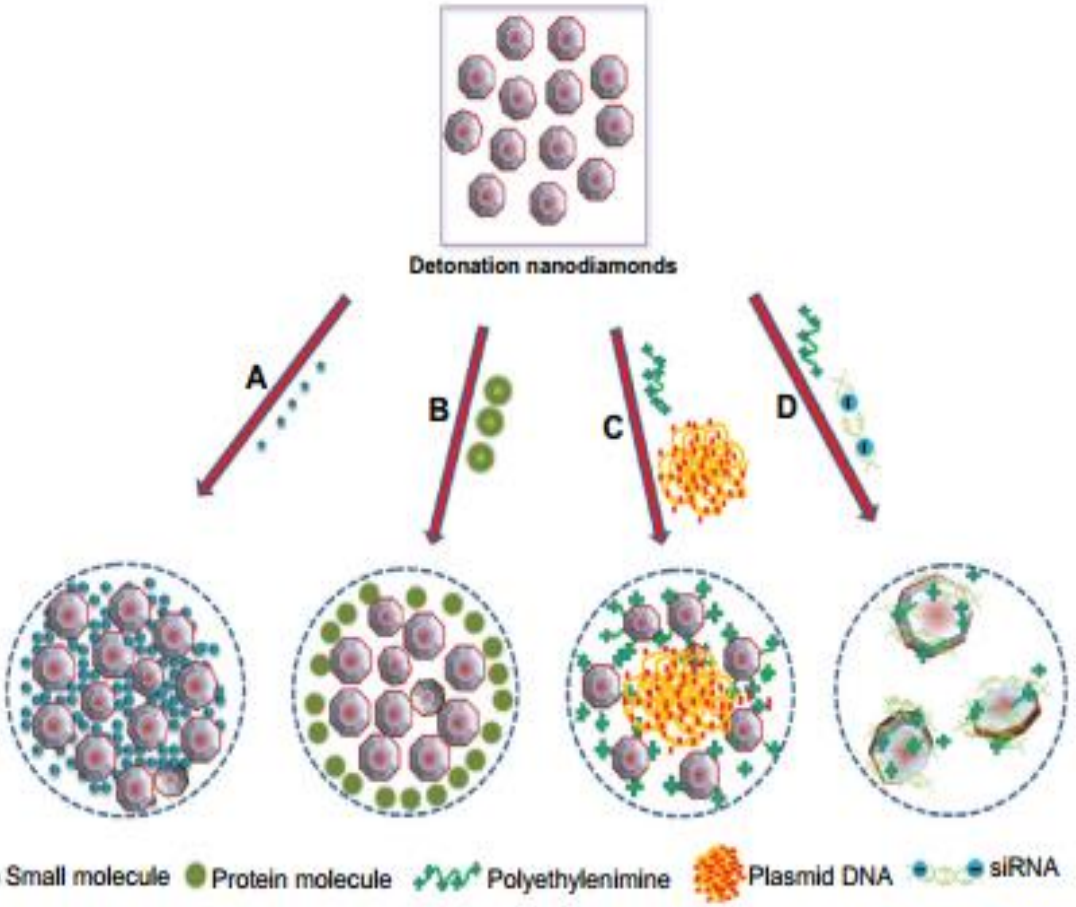
3. One or more therapeutic drugs can be attached to



Advantages

4.Attach to specific target cells and organs with selected binding agents

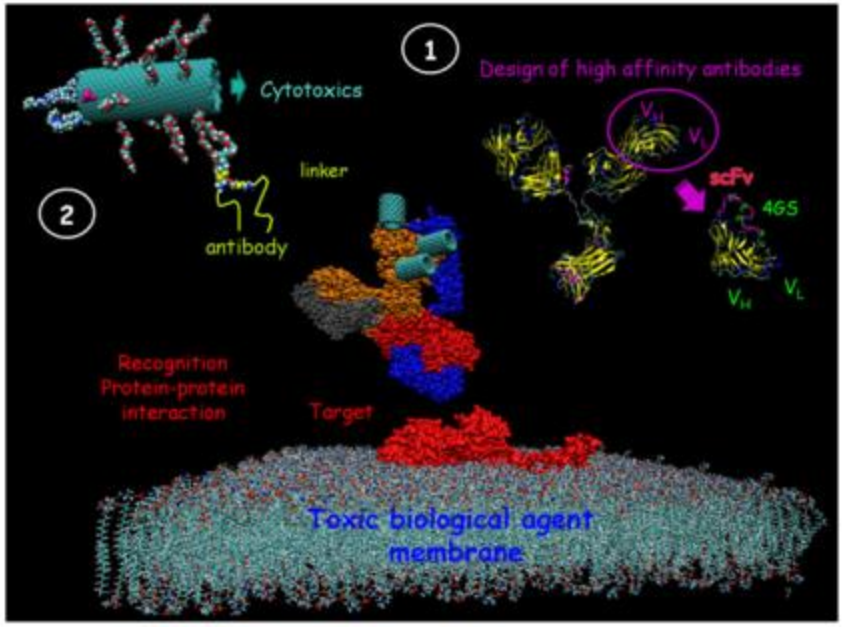
5.Helps to avoid the fluctuations of drug (by using time-release)



A schematic diagram representing the binding of detonation nanodiamonds with (**A**) small molecules,[72,73] (**B**) proteins,[73] (**C**) plasmid DNA,[44,109] and (**D**) siRNA.[110]

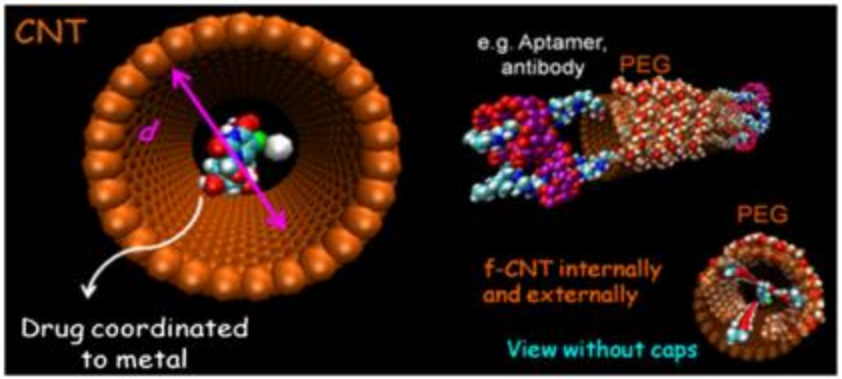
Specific Cancer Drug Design: Carbon Nanotubes

- Antibodies are designed that will fight cancer cells
- Carbon Nanotube carriers have molecular strands that contain the antibodies and a link system to cancer cells
- Recognize cancer cells by pH, biological markers



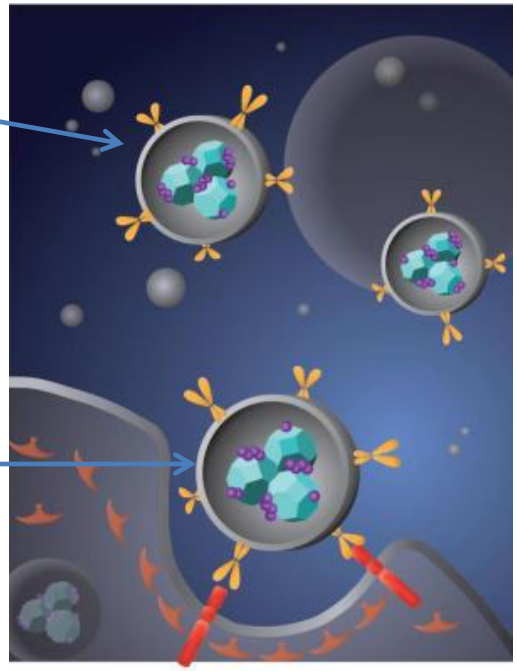
Specific Cancer Drug Design: Carbon Nanotubes

- Carbon Nanotubes can be PEGed and attached with antibodies to bring it specifically to a cancer cell
- The drugs inside the nanotube can be released in the presence RF frequencies
- Metal nanotubes also heat in presence of RF waves, and “burn up” cancer cells



Specific Cancer Drug Design: Nanodiamonds

- Drug can be placed in nanodiamonds
- Nanodiamonds contain receptors that allow them only to bind and react with tumor cells
- Nanodiamonds release drug into tumor cell and result in highly effective treatment



Thank You..!