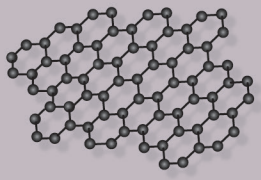
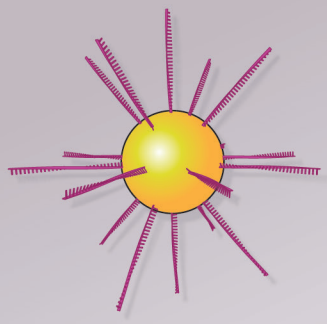
THE NANOMEDICINE CABINET

Scientists are engineering nanometer-size particles made of diverse materials to aid in patient care. The unique properties of these structures are making waves in biomedical analysis and targeted therapy.

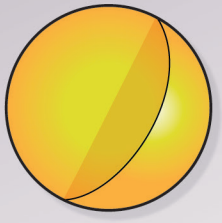


Graphene oxide (GO)
Monoatomic sheets are formed from oxidized graphite. GO nanosheets have unique electronic, thermal, and mechanical properties.

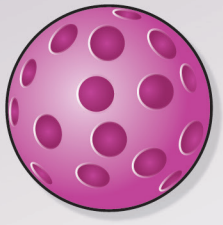
Quantum dots (QDs)
Because of their small sizes, QDs, nanocrystals of semiconductor materials, exhibit quantum mechanical properties that could improve cancer imaging and molecular profiling.



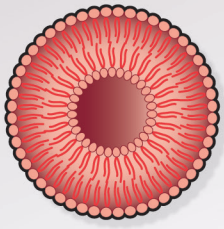
Spherical nucleic acids (SNAs)
Nucleic acids oriented in a spherical geometry, typically with a nanoparticle (e.g., gold spherules) as the core, are capable of sensitive molecular diagnostics and intracellular gene regulation.



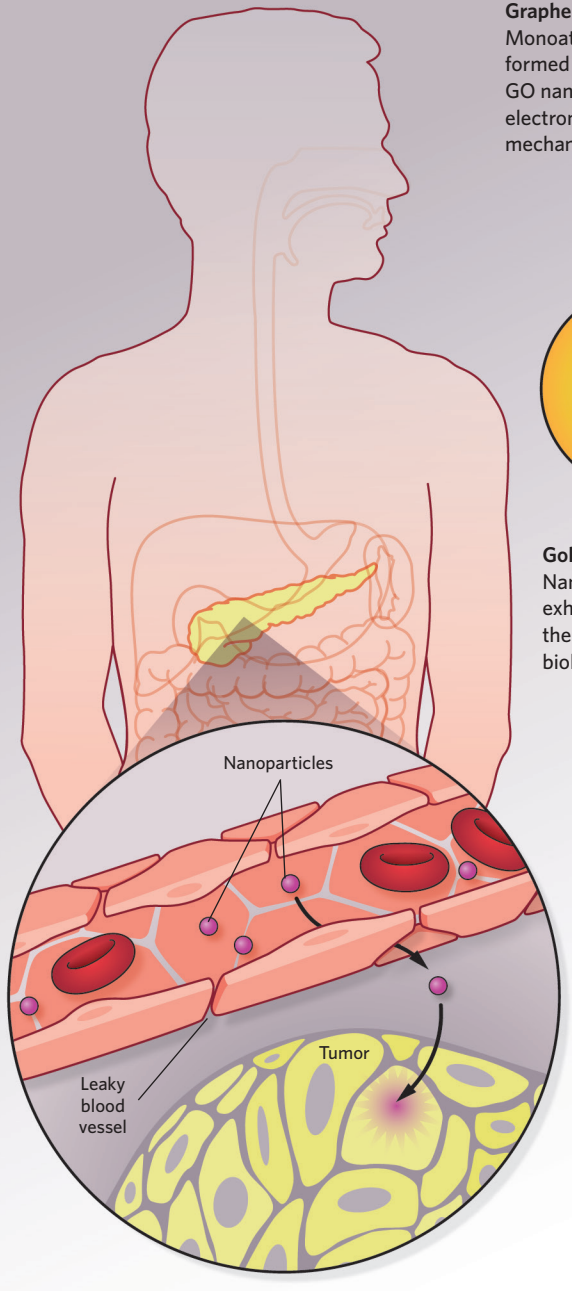
Gold
Nanoparticles of pure gold exhibit unique electronic, thermal, chemical, and biological properties.



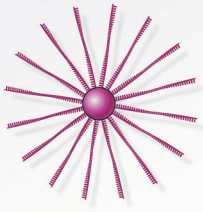
Silica
One type of silica nanoparticle riddled with pores can hold large quantities of molecular imaging agents or drugs.



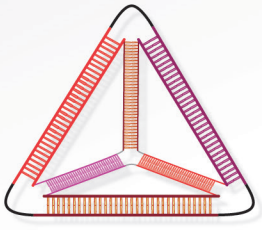
Liposomes
Spherical nanoscale vesicles composed of a hydrophilic core and hydrophobic lipid bilayer are widely used as containers for therapeutics or other biomedical agents.



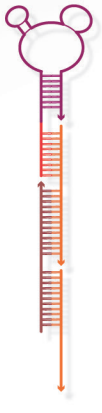
Nanomedicines can be administered systemically, where they travel through the bloodstream. They are small enough that they do not clog vessels, but because they're larger than many small-molecule drugs, they stay in the circulatory system for a prolonged period of time, during which they can penetrate leaky blood vessels in diseased tissues (e.g., tumor and inflamed tissues) and even enter living cells.



DNA micelles
DNA-lipid monomers self-assemble into nanostructures that can be readily modified to include bioanalytical or therapeutic add-ons and delivered into cells without any transfection agents. Their high resistance to nuclease digestion makes them ideal candidates for drug delivery and intracellular molecular analysis.



DNA tetrahedrons
DNA nanostructures in the shape of a tetrahedron can be modified to include molecular functionalities, such as targeting molecules, bioimaging agents, and therapeutics.



DNA nanotrains
Aptamer-tethered linear DNA nanostructures that have a high drug payload capacity can specifically deliver drugs or bioimaging agents into target cells.

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