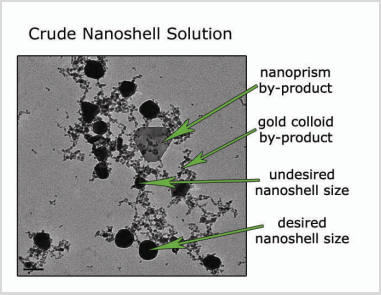
BIOE 451/452: Bioengineering Design

An opportunity for students to tackle and solve a design problem in bioengineering

May 2007

The Nanosorter



TEAM TINY TOOLS

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Rice Bioengineering
1st Place Design Poster Award

CENTER FOR BIOLOGICAL AND ENVIRONMENTAL NANOTECHNOLOGY CBEN RICE UNIVERSITY

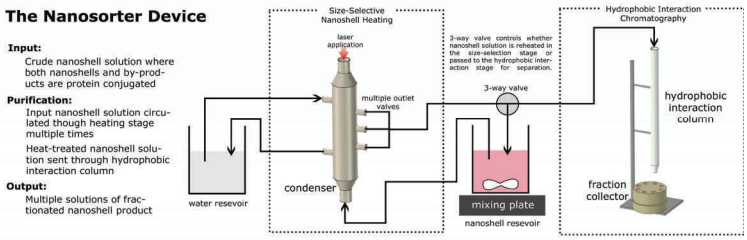
This initiative is made possible by CBEN and the Department of Bioengineering at Rice University.

Bioengineering Design Challenge

Currently, there are over 1.2 million new cancer cases each year in the U.S. alone. It is the second leading cause of death in the U.S. and from birth to death 1 out of 2 males and 1 out of 3 females will develop cancer. With these staggering statistics in mind the need for effective cancer treatment is greater than ever. Current treatment methods are systemic based chemotherapy or radiation therapy. Both of these options can have less that desirable effects on the surrounding tissues or organs. In an effort to overcome these circumstances, a method utilizing nanoshells to deliver the treatment was found to be specific solution to cancer treatment. However the creation of the nanoshell solution presented a new set of problems.

Appropriate Solution

The creation of nanoshells to fight cancer has the advantages of being relatively inexpensive to produce and providing "site specific" treatment of cancer. However after the nanoshells are created, the solution must be filtered for impurities and it is this purification process that created a "bottleneck" in the use of nanoshells. BIOE451 Senior Design members of Team Tiny Tools undertook the challenge and created a unique method for sorting the nanoshells from the impurities. The result was "The Nanosorter", a device that was designed to target this specific issue. The Nanosorter takes advantage of the properties of nanoshells; that they can be made to a specific wall thickness and that thickness can be varied. By utilizing this aspect of nanoshells, the Nanosorter uses a laser of a specific wavelength to "heat up" the particles. This allows them to be "sorted' in the device and sent to a collection chamber. Team members worked in conjunction with Andre Gobin in Dr. Jennifer West's lab at Rice University to develop their design solution, prototype design and testing protocols.



Current Status

The Nanosorter was tested by Team Tiny Tool members on the Rice University campus with exceptional results. At this time, an invention disclosure has been filed for the device.