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Self-propelled particles with novel applications in nanotechnology [1]

Submitted by Alejandra Casanova Sepúlveda [2] on 5 August 2016 - 5:01pm

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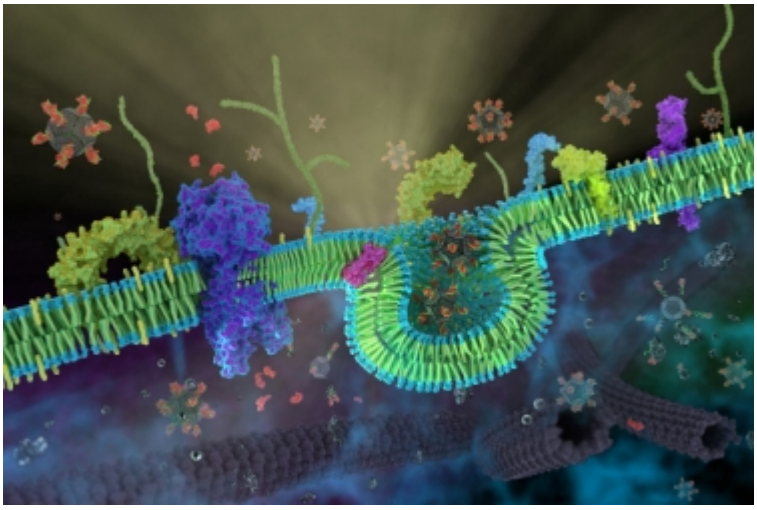

Retrieved from: http://www.nanobotmodels.com/2012/09/nanobotmodels-presents-new-illustration-of-drug-delivery-technology-using-nanodiamonds/ August/4/2016

Nowadays nanotechnology is in most of the aspects on our daily basis. It can be found in our smartphones, washing machines, cars, and health issues, in brief, it is everywhere. What relationship has this to colloidal particles? In fact, there are many reason to think that. Colloids are tiny particles of diameters between 10-6 and 10-9 meters suspended in a fluid, such as a liquid or gas. Colloidal suspensions are found in nature in common systems like milk, blood, detergents, fog, whipped cream and many others. Some examples of applications are cargo transportation, drug delivery, biological pump systems, etc. These applications could not be possible without an integrated use of technological design and nanoparticles. Scientists are conducting research to understand the dynamics of nanoparticles in order to make use of nanoparticles to construct structures and therefore novel materials. For example, nanomachines are relevant on many fields that help society, such as medical devices that can accomplish tasks in a less invasive way, they can also be used in the cleaning process of rivers, lakes, etc. This work is relevant because the development of nanomachines can be possible with the understanding of the design and dynamics of nanoparticles.During this summer I have been studying with guidance of Dr. Ubaldo

M. Córdova-Figueroa and Dr. Mir Karim the motion of a special class of nanoparticles that have the ability to self-propelled via different physical mechanisms. We use computer simulations to predict their motion and interaction with other particles. In particular, we developed a model to understand the diffusion and breakage of colloidal aggregates surrounded by self-propelled (or active) particles. This model is very important because it can be used to explain processes inside biological cells where proteins are typically found in an active fluid of molecular motors. It can also help explain novel approaches for breaking and transporting encapsulated drugs or cargoes in fluids containing microorganisms or other active systems. My REU experience has been a long process full of challenges. During this summer I learned about things that never crossed my mind. I have met many beautiful, smart, funny and humble people from different parts of Puerto Rico and also United States. Seen the process of research as an insider helped me realize how much work and passion is needed to successfully contribute to the research field.
