

## Understanding How Biological Systems React to the Introduction of Nanoparticles

**Greensboro, NC – August 1, 2019** – A researcher at the Joint School of Nanoscience and Nanoengineering (JSNN) is working with the Research Triangle Institute (RTI) to study whether exposure to nanoparticles provokes a toxic response in biological systems.

Nanotechnology is a relatively new scientific discipline, which is why health and safety effects of exposure to nanoparticles is not yet fully understood. Dr. Shyam Aravamudhan's research interests lie at the intersection of micro/nanotechnology and life sciences, with an overarching goal to question and better understand how biological systems function, and what levels of exposure to nanoparticles may be acceptable.

Due to the extremely small size of nanoparticles, and their large surface area-to-volume ratio, nanoparticles have unique properties compared with their larger counterparts; the effects of nanoparticles are often more potent because their small size allows them to travel and interact more effectively than their larger counterparts.

Aravamudhan's research with RTI involving nanomaterial toxicity is conducted using tissue samples of rats. Although rats are smaller than human beings, their organ systems are similar to ours. The tissue samples represent the entire life spectrum, from embryonic tissues, to those of pregnant rats and even mature rats toward the end of life. Aravamudhan's lab analyzes tissues exposed to a wide variety of nanoparticles such as those found in food additives, consumer products such as cosmetics and more. Thus far, Aravamudhan's lab has analyzed tissues exposed to a number of metal oxide nanoparticles with varying physiochemical properties and have compared their results to those obtained by other universities in this National Institutes of Health (NIH) consortium study.

"NIH's National Institute of Environmental Health Sciences (NIEHS) created the Nanotechnology Health Implications Research (NHIR) consortium involving several research institutions including RTI with N.C. A&T as a partner to focus on nanosafety research," explains Aravamudhan. "We each receive the same set of nanoparticles, but consortium members expose them to a unique set of tissue samples. Every couple of months we convene with RTI to discuss progress, and we meet annually with NIH and the other participating institutions to report results and share outcomes."

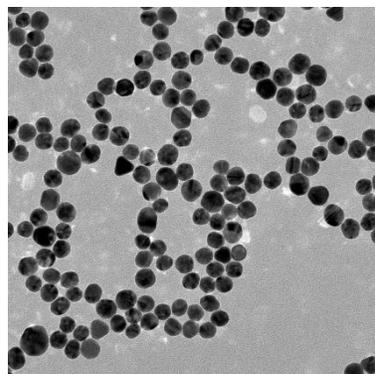


*Nanoparticles allow scientists to go places that were previously off-limits*

Because of the small, nimble nature of nanoparticles, they have abilities and characteristics that their larger counterparts do not. They can go places, through barriers, carrying things which can make them extremely useful and powerful; nanoparticles allow scientists to go places that were previously off-limits! But, these pioneering materials bring with them the potential for problems, which is why studying toxicity is so important. “We must be sure of the acceptable exposure levels, by particle, by tissue. True, nanoparticles allow us access to unexplored parts of biological systems, but we must make sure they are safe.”

### **About the Joint School of Nanoscience and Nanoengineering**

The Joint School of Nanoscience and Nanoengineering (JSNN) is a collaboration between two high research universities: North Carolina A&T State University and The University of North Carolina at Greensboro. JSNN actively recruits organizations from academia, industry and government to join as members. JSNN provides members with training and 24/7 access to JSNN's facilities, state of the art tools and labs. The research and collaborations formed through membership are leading to breakthroughs in materials, products and processes that stimulate the economy and improve the world. JSNN is located on the south campus of Gateway Research Park, another collaboration between N.C. A&T and UNCG. Being located at the Park provides the opportunity for members to locate or co-locate facilities adjacent to JSNN's facilities for 24/7 access to tools and labs, resulting in economic development and job creation for Greensboro.



*An Electron  
Micrograph of 15  
Nanometer Metal  
Oxide Nanoparticles*



**North Carolina Agricultural and Technical State University** is the nation's largest historically black university. Classified a "higher research" university by the Carnegie Foundation, it is a land-grant member of the University of North Carolina System. A&T is known for its leadership in producing graduates in engineering, agriculture and other STEM fields. The university was founded in 1891 and is located in Greensboro, North Carolina.