

**Your link to better MRIs: Louisiana materials scientists developing customizable imaging agents**

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**RII:** Louisiana Alliance for Simulation-Guided Materials Applications (LA-SiGMA)

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***What is the outcome or accomplishment?***

A Xavier University research team led by Dr. Vladimir Kolesnichenko and Dr. Galina Goloverda is currently developing magnetic imaging agents for medical scanning devices. Custom imaging agents are being designed by linking different molecules to the shell of a metal oxide particle. Since the tiny building blocks for these imaging agents are molecules, they are classified as “nanoparticles.”

Each component of the nanoparticle can be customized to change the function of the imaging agent. For example, the magnetic core of the particle can be designed to interact with different biological mediums, like blood or tissue, and send a signal to the imaging equipment. Drug molecules can be linked to the organic shell of the particle to be time-released and interact with the targeted area during the scan.

***What is the impact?***

Custom magnetic imaging agents will help provide radiologists with the ability to track malignant cells and biomolecules, and finalize diagnostics more reliably and quickly with fewer side effects for the patient. These custom imaging agents can be used for both positive and negative MRI scans, “cell tracking,” which labels cells that may be obscured behind body tissue, and for tagging biomolecules of interest, such as proteins, antibodies, or amino acids.

***What explanation/background does the lay reader need to understand the significance of this outcome?***

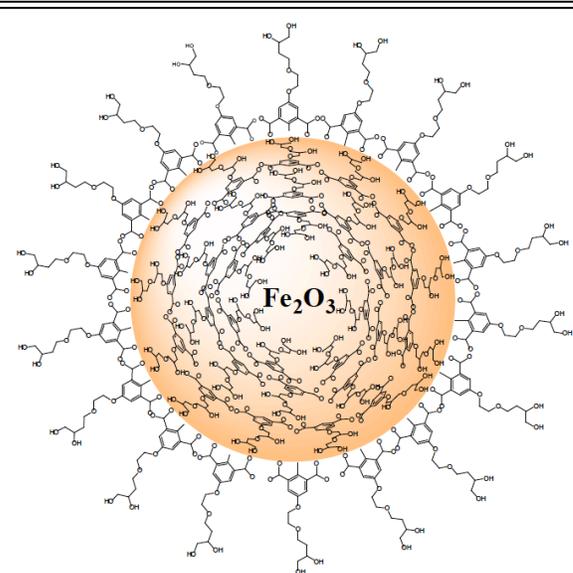
The small size of the nanoparticles reduces the dosage needed to target cells and tissues, which, in turn, reduces the patient side effects caused by scanning agents.

Magnetic imaging agents currently used for MRI positive imaging are toxic to the patient because they contain gadolinium compounds. Current gadolinium agents also have high mobility in the vascular system, which greatly limits the testing time.



**Mr. Corey Arnold, undergraduate Chemistry student, using the chemical vapor deposition system for materials research at Xavier University of Louisiana.**

**Credit:** Vladimir Kolesnichenko, Chemistry Department, Xavier University, [vkolesni@xula.edu](mailto:vkolesni@xula.edu)



**An imaging agent composed of an iron oxide nanoparticle coated with a thin layer of “linkers” that can be used to attach molecules to it.**

**Credit:** Vladimir Kolesnichenko, Chemistry Department, Xavier University, [vkolesni@xula.edu](mailto:vkolesni@xula.edu)