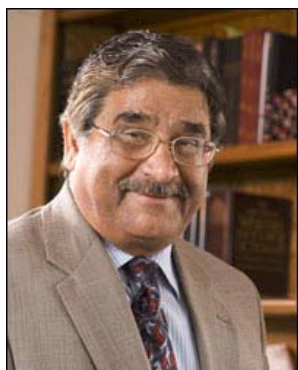


Feature article . . .

Nanomagnets create concentration-dependent contrast in Magnetic Resonance Imaging



Dr. NARESH DALAL

Dirac Professor of Chemistry and Biochemistry at FSU.

Magnetic resonance imaging, or MRI, has revolutionized health care, providing doctors with a highly accurate, non-invasive tool for diagnosing cancer, injuries and other maladies within the human body. Now, a Florida State University researcher has collaborated in a research project that could lead to ways of producing even sharper medical images.

Naresh Dalal, the Dirac Professor of Chemistry and Biochemistry at FSU, recently conducted experiments with other researchers from FSU, the University of Colorado and the National Institute of Standards and Technology that uncovered unique properties in a molecular magnet - properties that could significantly increase the resolution of MRIs. Their paper, "Efficacy of the Single-Molecule Magnet Fe₈ for Magnetic Resonance Imaging Contrast Agent Over a Broad Range of Concentration," was published in the current issue of Polyhedron, a rigorously peer-reviewed science journal.

"There are continual efforts to enhance the level of image clarity found in today's MRI devices," Dalal said. "MRIs utilize injectable dyes, but those in current use, while easy to manufacture, offer a relatively low contrast. Our experiments show that a class of materials known as single-molecule magnets might produce greater contrast in medical imaging, meaning MRIs would be much more accurate."

Working at FSU and the National High Magnetic Field Laboratory, Dalal and another FSU researcher, chemistry graduate teaching assistant Vasanth Ramachandran, were able to synthesize a substance known as Fe₈ that is one of the strongest magnets known.

"Fe₈ is a molecule made up of eight iron ions that form a tight molecular bond," Dalal said. "It has a powerful magnetic field, which is obviously important in generating a very clear image with an MRI device. What's more, Fe₈ is non-toxic and water-soluble, making it safe for injection into the body."

Molecular magnets such as Fe₈ hold great potential for other applications as well, he said.

"Computer memories and other high-tech storage devices utilize magnetic compounds," Dalal said. "Consider the compact disc. Using current technologies, the magnetic coating on a disc's surface is about 1 micron - one-millionth of a meter - in depth. But if a CD instead were coated with Fe₈, the Fe₈ film would be only about a nanometer - one-billionth of a meter - deep. This could increase our ability to store data in smaller and smaller spaces." It also could lead to significant breakthroughs in the area of quantum computing, which has the potential to create computers that are exponentially faster and more powerful than the ones in use today, he said.

Despite the promising results suggested by the team's research, Dalal admitted that there still are some hurdles to overcome before Fe₈ becomes a viable MRI option.

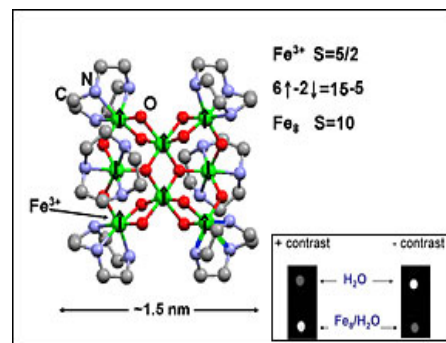
long periods of time and transported easily."

Dr. Dalal's research in this field has been going on for six years.

(Contributed)

"These compounds are not very stable," he said. "They break down in water within a few hours. We're now looking at ways to increase their stability so that they can be stored for

Fe₈ MOLECULE. GREEN SPHERES REPRESENT Fe-IONS. ALSO SHOWN: EFFECT OF ADDING Fe₈ ON MEDICAL IMAGE CONTRAST



In Memoriam: Dr. David Gruender

It is with a deep sense of sadness that we wish to record the passing of one who has been an active member of our Board for several years, Dr. David Gruender, after a very short illness. He leaves behind his wife Betty, who has not been in the best of health for several years, as well as three daughters.

TSS members are asked to attend a memorial service to be held in his honor on Thursday, May 24, at the Werkmeister Hall, on FSU Campus. Our Treasurer, Dr. Dave Edelson, a close friend of the family, will speak on behalf of the Society.

Dave was a philosopher, specializing in the field of the sciences. He was the TSS Gorrie Traveling Lecturer in 2000/1, taking the lecture, *The History and Philosophy of Science*, to several communities within the Society's service area - a fifty-mile radius from downtown Tallahassee.

TSS will also organize a Memorial Lecture with the same title, for presentation in the near future.

Carbon Nanotubes for Body Armor?

A new application of carbon nanotubes, the very interesting development from buckminsterfullerene (buckyballs), was determined recently by Dr. Okenwa Okoli, Professor of Industrial and Manufacturing Engineering at the FAMU-FSU College of Engineering. In this application, the material, which is lightweight but extremely strong, is used to make body armor, for protecting soldiers on the battlefield. A discovery of this type was long overdue.

It will be recalled that FSU Professor of Chemistry, Sir Harry Kroto, shared the 1996 Nobel Prize with two colleagues, Richard Smalley and Robert Curl, who jointly discovered buckminsterfullerene.

Departments

Lannutti Memorial Lecture

The 2007 Lannutti Lecture maintained the high standard that had been set for the event over the years. Held as we were going to press, on April 5, 2007, the lecturer was Dr. Homer Neal, Professor of Physics at University of Michigan, and a personal friend of the late Dr. Lannutti.

Dr. Neal addressed the crises in US Science Policy, showing the declining interest over the years, after a period of advancement in the middle-1900s. This spirit has to be recaptured, for which one of the fundamental requirements will be improvements in our education system.

Leon Association for Science Teaching (LAST)

The 2007 Awards Banquet will be held at the Silver Slipper Restaurant on Tuesday, April 24, 2007, beginning at 6:00 p.m. Reservation for this gala event is \$25 per person.

Let Us Hear From You

Please send your newsworthy items to our Editor, Al Hall, at halla@talgov.com, to share them with the membership of the Society.