

From the Director

WELCOME TO THE 2006 ISSUE OF *Inquiry* magazine. As I write this in early August, the clock is ticking down on the competitive bidding process for operation of Ames Laboratory. It's the first time in the nearly 60-year history of the Lab that the Department of Energy will consider potential contractors besides Iowa State University, the Lab's exclusive contractor since its inception. By the time you read this, the bidding process will be completed and the contract awarded.

While the outcome of that process is unknown at this point, one thing is crystal clear — the quality of the research at Ames Laboratory continues to be world-class. For the second straight year and the 16th time overall, Ames Laboratory researchers have received an R&D100 Award. Mark Bryden, Gerrick Bivins, and Doug McCorkle have created software that takes large 3-D data sets and quickly converts them into images with which engineers can analyze and work. The software has been used to study ways to reduce emissions from power plants, decrease pollution from swine confinements and improve vehicle efficiency — the possibilities are almost limitless. You can read more about this exciting work in the Bryden group on the opposite page.

Senior physicist Costas Soukoulis won international recognition in December, coordinating a multinational team that received the Descartes Prize for Excellence in Scientific Collaborative Research, the European Union's highest honor in the field of science. He and his collaborators received the prestigious award for creating a novel class of artificial metamaterials called left-handed materials, which exhibit negative refraction, bending light in the opposite direction to that seen in natural materials. You'll find information on Dr. Soukoulis' award and pioneering work on Pages 9 and 20.

Chemist Victor Lin continues to find exciting uses for tiny particles of silica — mesoporous nanoparticles. His latest effort utilizes them to deliver drugs within living cells and selectively release their pharmaceutical payload so that only targeted cells benefit from the drug while healthy cells are left unaffected. You can see the system in action beginning on Page 14.

One of the long-standing mysteries in organic chemistry — a field close to my heart — is the nature of the mechanism that triggers the Fenton reaction, one of the most powerful oxidizing reactions available for breaking apart organic compounds. Ames Lab senior scientist Andreja Bakac and her collaborators at two other universities, were able for the first time to produce and study a novel compound containing iron and effectively rule out its frequently speculated involvement in the Fenton reaction. Dr. Bakac's work is detailed on Page 12.

Ames Laboratory's education efforts continue to benefit the young people of Iowa and students from around the country. Teams from our Regional Middle School and High School Science Bowl competitions both finished in the prize money at their respective national contests, competing against often much larger schools from around the country. Our Science Undergraduate Laboratory Internship, or SULI, program brought another 10 undergraduate students from all over the United States to work closely with Ames Lab and Iowa State University research mentors in a variety of disciplines.

And we've initiated a Laboratory Science Teacher Professional Development, or LSTPD, program that will bring 10 middle school teachers from Iowa, Minnesota and South Dakota to the Lab to participate in the Teachers as Investigators program starting next summer. Through the program, teachers will conduct hands-on, discovery-based experiments with advanced equipment right here at the Lab and then learn how to bring exciting breakthroughs and frontiers of science into their classrooms.

As the research projects detailed in the pages of *Inquiry* demonstrate, Ames Laboratory is committed to finding solutions through innovative science. I hope that you enjoy learning about some of our recent successes, as well as our efforts to ensure that our country has outstanding scientists for the future.



Jim Buxton