Dr. Edward Flynn, founder and president of Senior Scientific, LLC, has developed a nanotechnology-based, magnetic imaging method for early diagnosis and treatment of cancer that could provide a significant increase in detection sensitivity; much earlier detection of certain cancers; more targeted therapies; and potentially better treatment outcomes. Senior Scientific operates out of a 3,500-square-foot laboratory at the University of New Mexico’s Science and Technology Park and received about $3.5 million in research grants from the National Institutes of Health since 2002 to develop this technology.

Flynn’s methodology uses a superconducting quantum interference device (SQUID) sensor array to measure the magnetic fields of labeled magnetic nanoparticles that are injected into the body. The nanoparticles are attached to cells carrying specific antibodies that bind with cancer cells, and pinpoints the exact location of diseases. The sensor system can detect 50,000 cells at a distance of 4 cm. A typical mammogram needs about 10 million cancer cells for detection.

Characterization of the properties of these nanoparticles is important in order to provide proper selection of particles and optimize cell sensitivity. Facilities at the Center for Integrated Nanotechnologies are currently being used to investigate these properties. “CINT has become Senior Scientific’s primary resource for characterization because of their ability to develop, characterize, and produce nanoparticles reliably,” said Flynn. “Characterizing the properties of the nanoparticles involves determining the particles magnetic strength, size, and coating, using instruments that are not available at the university, and working with CINT gives Senior Scientific control of this process.” Dale Huber, a principal member of the technology staff at CINT, said, “[Flynn] is a brilliant scientist and is driven by his commitment to tackling cancer. That CINT opened its labs to Senior Scientific reflects the caliber of Flynn’s achievements.”

In 1998, after Flynn’s second wife was diagnosed with breast cancer, Flynn began his research using magnetic particles to detect cancer cells. Flynn said, “If we can detect cancer much earlier before it spreads, there is higher likelihood for successful
From Discovery to Innovation...

Scientific discovery inspires the innovation that drives economic prosperity – but discovering new properties of nanometer-size materials is insufficient to ensure technological innovation and benefit to humankind. This is why CINT focuses on integration issues. What knowledge is needed in order to exploit nanomaterials for various applications?

By attracting researchers interested in these problems, CINT creates scientific communities that tackle these challenges. In fact, virtually all of CINT’s user projects involve teams of researchers: consisting of researchers from academia, research laboratories or private-sector companies working with CINT Scientists. Approximately half of the user projects involve multiple CINT Scientists, thereby pulling together the combined expertise that cannot be found in one institution.

CINT accepts hundreds of user-defined projects each year, generating knowledge that ranges from the most basic physics to valuable intellectual property protected by patents. Although the majority of the user projects involve pre-competitive research that will be published in the peer-reviewed technical literature, CINT users can conduct proprietary research as well. User proposals containing proprietary information are reviewed via a separate process to maintain confidentiality under protection of an executed Non-Disclosure Agreement between CINT (Los Alamos National Laboratory and Sandia National Laboratories) and the prospective user’s institution.

CINT also recognizes that the pace of innovation often requires rapid investigation. Hence, CINT accepts “Rapid Access” user proposals, submitted via the web site, that clearly demonstrate a need for immediate access to conduct well-focused, short-term work with extremely high-impact potential. If approved, Rapid Access User Projects remain valid only until the beginning of the next available regular application cycle.

For further information about private-sector research at CINT (either pre-competitive or proprietary), please contact the CINT User Program Manager, Neal Shinn (ndshinn@sandia.gov).