



Contact Information

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College of Engineering

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A Message from the Director

Thank you for your interest in the Scintillation Materials Research Center (SMRC). The center is a unique, multidisciplinary research facility formed by a collaboration of the University of Tennessee and Siemens Medical Solutions Molecular Imaging.

Our mission is to discover and develop new scintillation materials, which will provide the foundation for the next generation of gamma ray, x-ray and neutron detectors. New radiation detectors will have a major impact on future medical imaging systems, homeland security inspection and monitoring systems, neutron and high energy particle physics experiments and remote exploration for new energy resources.

This brochure will introduce you to our research program and provide information on the many opportunities for researchers at various levels. The SMRC welcomes students as well as experienced researchers interested in exploring new scintillation materials and developing exciting new applications of scintillator technology. We invite you to visit our web site at <http://www.engr.utk.edu/smrc>, or contact us by phone at (865) 974-0254, for further information.

Sincerely,
Prof. Chuck Melcher, SMRC Director



What Are Scintillation Materials?

Scintillators are materials that absorb energetic radiation, such as gamma rays, X-rays or neutrons, and convert that energy into bursts of visible photons. These photons are then converted into electrical pulses by photo-detectors. Scintillation materials exist in many physical forms, including crystals, glasses, powders, ceramics, plastics, liquids and gases. The SMRC concentrates primarily on inorganic single crystals, glasses, glass fibers and nanophase-powders.



Inorganic crystals have superior performance for the detection of high-energy gamma rays, while glasses and glass fibers are often used for neutron detection. Ceramics are commonly used for X-ray imaging, and nanophase-powders allow the synthesis of special compositions that, if successfully developed, may become viable, improved alternatives to single crystal scintillators.

SMRC Research

The center combines the academic resources of the university with the scintillator research legacy of Siemens in a single organization dedicated to the development of innovative materials for state-of-the-art radiation sensors and imaging systems. Located in the university's Science and Engineering Research Facility, the center's research activities include:

- Synthesis and characterization of new material compositions
- Fundamental investigation of scintillation mechanisms
- Development of novel crystal growth techniques
- Applications of nanotechnology to ceramic scintillator fabrication
- Modification of existing optical materials for scintillator applications
- Mathematical modeling of detectors, materials, and synthesis processes

- Optimization of existing scintillation materials for specific applications
- Advances in scintillating fiber technology

Scintillators in Science & Industry

The SMRC conducts both basic research and research based on the scintillation material needs of private industry and national laboratories. Scintillator development is crucial to the advancement of a variety of commercial and scientific applications including:

- Medical imaging systems for early detection of diseases, such as cancer, Alzheimer's and heart disease
- Homeland security inspection and monitoring equipment
- Energy exploration equipment aiding in the search for current and future sources of energy



- Detectors for basic research including those used in the search for new elementary particles at major accelerator facilities around the world and neutron detectors used in fundamental investigations of matter at the Spallation Neutron Source in nearby Oak Ridge, Tennessee

Academic & Professional Advantages

Students choosing to pursue research in the field of scintillation materials can look forward to promising careers. With the widespread use of scintillators in both commercial and scientific applications, there is high demand for individuals with expertise in this area.

The SMRC supports graduate and undergraduate students, post-doctoral researchers, faculty and visiting scientists and provides a framework for interdisciplinary teams to pursue advances in scintillation materials and to connect with industry.