

Center Information

Scintillation Materials Research Center

301 Science and Engineering

Research Facility

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THE UNIVERSITY of TENNESSEE **UT**

KNOXVILLE

COLLEGE OF ENGINEERING

Scintillation Materials Research Center



RESEARCH CENTER PROFILE

www.engr.utk.edu/smrc

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SCINTILLATION MATERIALS RESEARCH CENTER

Message from the Director

Thank you for your interest in the Scintillation Materials Research Center (SMRC). The center is an internationally recognized research facility for the discovery, synthesis, and characterization of new materials for use in radiation detection. We are supported by funding from both private industry and government agencies.

Our mission is to develop new scintillation materials that will transform the next generation of gamma-ray, x-ray, and neutron detectors. New radiation detectors continue to be a critical need in 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 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.

We invite you to visit our web site: <http://www.engr.utk.edu/smrc> or contact us by phone at 865-974-0254 for further information.

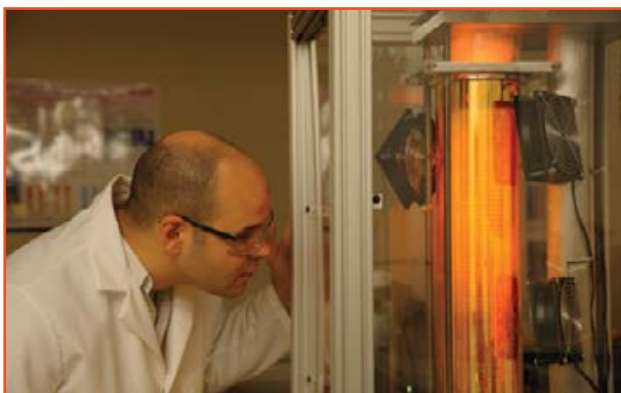
Sincerely,
Prof. Chuck Melcher, SMRC Director



What Are Scintillation Materials?

Scintillators are materials that absorb energetic radiation such as gamma rays, X-rays, or neutrons and convert that energy into short 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, polycrystalline ceramics, and thin films.

Inorganic crystals typically have superior performance for the detection of high-energy gamma rays, while polycrystalline ceramics can offer lower cost alternatives in some cases. Thin films are being developed for high-resolution radiography as well as for combinatorial materials discovery.



SMRC Research

The center focuses the academic resources of several departments on research projects 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:

- Scintillator discovery
- Crystal growth
- Characterization of new scintillator compounds
- Fundamental investigation of scintillation mechanisms
- Development of novel synthesis techniques
- Synthesis of polycrystalline ceramics
- Thin film synthesis
- Numerical simulations of growth conditions
- Theoretical investigations of structural and optical properties of crystals



Scintillators in Science and Industry

The SMRC conducts both basic research and applied 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 to identify current and future petroleum reserves
- Detectors for basic research; examples include detectors used in searches for new elementary particles conducted at various accelerator facilities around the world and fundamental studies of matter using neutron scattering at the Spallation Neutron Source in nearby Oak Ridge, Tennessee

Academic 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 welcomes students as well as experienced researchers interested in exploring new scintillation materials and developing exciting new applications of scintillator technology.

