



# UTRF Inventor Spotlight: Dr. Charles "Chuck" Melcher & UT's Scintillation Materials Research Center



The University of Tennessee's (UT) Scintillation Materials Research Center (SMRC) was founded in 2005 as an industry-university partnership between UT and Siemens Medical Solutions.

The research center's Director, Dr. Charles Melcher, oversees a diverse group of students, faculty, and researchers who are continuing the work he started during his career in industry, studying and developing novel radiation detection materials, or scintillators.



detection applications, including use in sensors and imaging systems. When the SMRC was established, its sole focus was the development of scintillation materials for medical imaging. Since then, the research center has branched out into other areas, including homeland security inspection and monitoring.

Despite its expansion in research interests, medical imaging continues to be one of the SMRC's core research areas. Medical imaging systems employ radiation sensors that detect gamma rays emitted from radioactive tracers injected into a patient's body and help doctors to detect and diagnose disease, such as cancer and heart disease. A sensor's sensitivity to gamma rays is driven by the properties of its scintillation materials. The SMRC team is focused on identifying lower cost scintillation materials that can be used for radiation sensors that are more sensitive, have a higher resolution, and are less expensive. These improved scintillators can lead to more accurate, earlier diagnoses and allow medical imaging to be more widely available and affordable for patients.

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The Scintillation Materials Research Center (SMRC) Team: front row, l-r: Dr. Mariya Zhuravleva (Assistant Professor), Camera Foster, Merry Koschan (Research Associate), Cordell Delzer, Robyn Collette, Dr. Chuck Melcher (Director), Joe Kelsey, and Kevin McDonald; back row, l-r: Daniel Rutstrom, Noah Schaftlein, Jesse Johnson, Matt Loyd, Luis Stand, and Josh Smith.

Team members not pictured; Dr. Yuntao Wu (Assistant Research Professor), Kaycee Gass, and Eleanor Comer.

One line of research being conducted in the area of medical imaging is led by SMRC Research Associate Merry Koschan, who worked with Dr. Melcher at Siemens and accompanied him when he came to UT. Merry's work focuses on the Czochralski crystal growth process, a method of crystal growth used to obtain single crystals of semiconductors, metals, salts, and synthetic gemstones. At the research center, she conducts co-doping experiments to develop oxide materials that have properties (e.g., high density, fast decay



including the use of sensors to detect the illicit transport of radioactive materials. The SMRC has partnered with the Departments of Homeland Security and Energy in their research efforts to invent scintillation materials that can more precisely distinguish between different radiation energies and determine whether a source is natural (e.g., background radiation found in the environment) or illegal (e.g., plutonium).

Since its founding, the SMRC has earned a reputation as a leader in scintillation discovery, crystal growth, and material characterization. Much credit goes to the research center's students, faculty, and researchers who are motivated not just by the science but the importance of their research and discoveries for society.

*“After touring our facility, people often comment that they never knew radiation detection could be such an interesting field or that you could do this type of work for a living,” relates Merry Koschan. “It is satisfying to know that I am engaged in work that truly benefits people in a tangible way, that it is not just an academic exercise. At the end of the day you feel good about that.”*



to needs around filing invention disclosures and patent applications. Their location in East Tennessee has its own set of perks as well. The region is home to a large number of companies engaged in crystal growth techniques and technologies and the Oak Ridge National Laboratory has proven to be an invaluable resource in their research efforts.

*“Dr. Melcher and his team are playing a role in developing the next-generation scintillation technology that will advance how we detect disease and protect our country from threats from radioactive materials,” said Maha Krishnamurthy, UTRF Assistant Vice President of Licensing. “We are proud to support their work in bringing innovative materials for state-of-the-art radiation sensors and imaging systems to reality.”*

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## **SMRC Group Members**

Chuck Melcher, Director

Mariya Zhuravleva, Assistant Professor

Yuntao Wu, Assistant Research Professor

Merry Koschan, Research Associate  
Graduate Students:

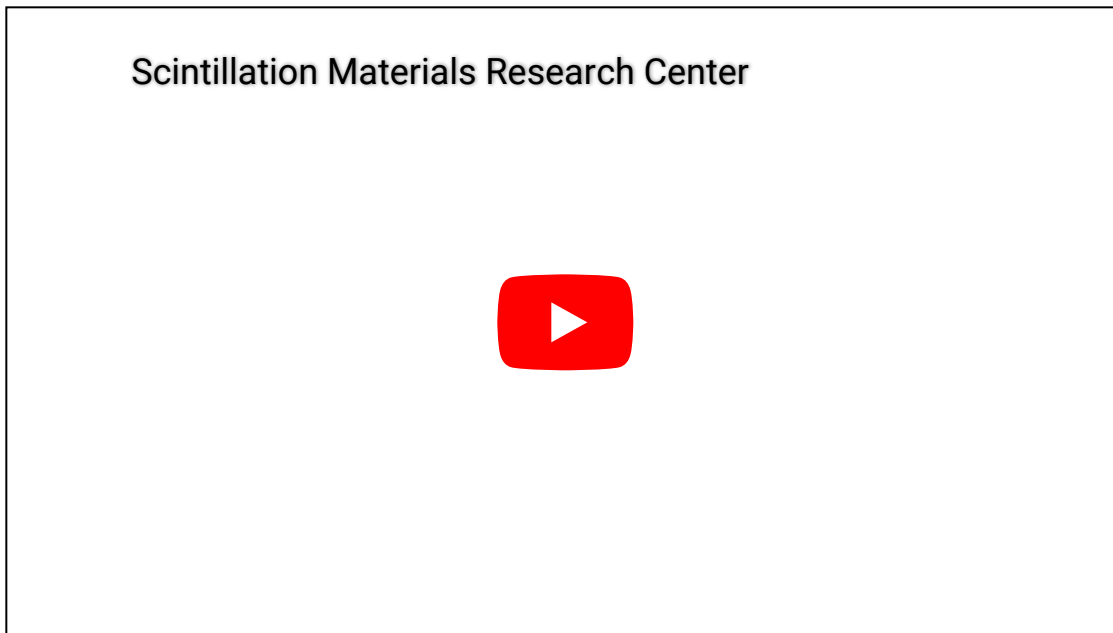
Matt Loyd



Kaycee Gass

Eleanor Comer

[View video from the UTK SMRC webpage:](#)



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