Imagine a future where X-ray imaging is not only safer but also faster, more efficient, and more accessible for everyone. X-ray technology plays a critical role in diagnosing medical conditions, from broken bones to detecting early signs of cancer. However, current state-of-the-art materials, such as perovskites, used in next-generation detectors, contain lead, which poses serious environmental and health risks. What if we could replace those materials with something safer, just as effective, and even better at detecting X-rays? That's exactly what we're working on.

In this project, we are developing lead-free perovskite materials—cutting-edge, non-toxic compounds that offer superior sensitivity and stability. These materials have the ability to detect X-rays more effectively, with advantages like higher sensitivity, longer-lasting durability, and customizable energy properties. Additionally, these new perovskites exhibit smaller dark currents and can be made more environmentally stable, making them an ideal solution for X-ray detection.

However, creating these materials is only part of the challenge. For X-ray detectors to work effectively, we need thick films of these materials that can absorb a large portion of the X-rays and produce accurate, high-quality images. While it may sound simple, thick perovskite films have never been successfully made—until now. Through our innovative hot-press technique, we are able to create large-area, uniform perovskite films that are perfect for use in X-ray detectors.

This breakthrough means that in the near future, X-ray detectors will be safer, more affordable, and highly efficient—all thanks to these advanced perovskite materials. By eliminating the use of lead and improving the performance of X-ray detectors, our work could pave the way for safer imaging technologies in healthcare, providing clearer, more accurate diagnostics, faster results, and ultimately, better treatment options for patients worldwide.

With these new, safer, and more efficient detectors, we're not just improving X-ray technology—we're creating a future where medical imaging is better for people, better for the environment, and more accessible for everyone. The potential impact on healthcare could be truly transformative, making this an exciting step forward in the evolution of medical technology.