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LirOptic's shape-shifting, tunable optics lenses promises industry transformation

Sometimes science takes a surprising turn. While working on a high-tech imaging project, Professor Dominic Zerulla and his nano-optics team at the University College of Dublin (UCD) discovered something unexpected: by applying a small voltage to a nanometer thin optical coating, they could not only change the overall shape of the optical element but control that shape with extreme precision.

Realizing the potential of this breakthrough, a startup called LirOptic was formed. Based in Dublin, the spinout from UCD is developing smart, solid-state lenses that can adjust their shape on demand — without any mechanically shifting parts.

Simon Forsyth, co-founder and CEO of LirOptic. (Photo provided by LirOptic)

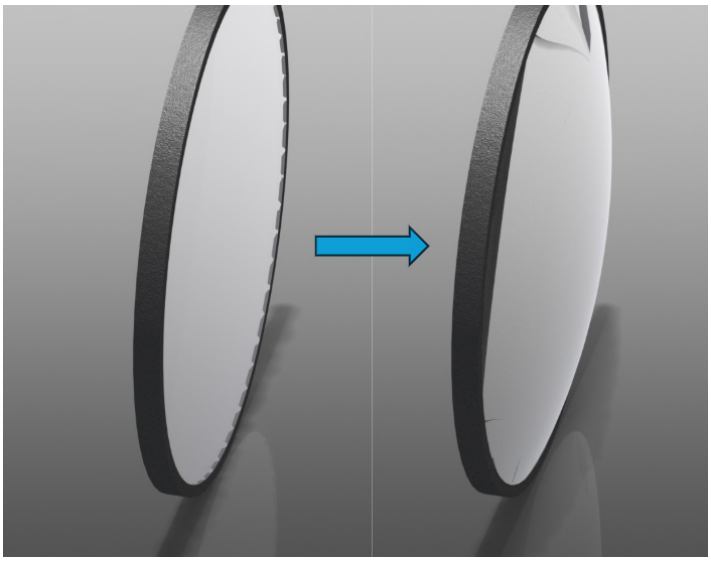
These shape-shifting lenses could solve long-standing problems in today's adjustable optics, opening up new possibilities in everything from medical imaging and smartphones to space tech and self-driving cars.

REVOLUTIONIZING OPTICS AND IMAGING

"Existing adjustable lens technologies have limitations that impact how and where they can be used," said Simon Forsyth, co-founder and CEO of LirOptic. "Our adjustable solid-state lens offers optical innovators unparalleled compactness, reliability, and precision. In addition to facilitating the miniaturization of medical imaging devices, our technology has the potential to improve cell phone imaging systems, as well as demanding optical applications for extended reality (XR), space, and automotive."

These improvements are made possible by several key differentiators over the adjustable lenses on the market today.

LIROPTIC™



Lens with a frame BEFORE (left) and after (right) the deformation process (when the voltage is applied). (Photo provided by LirOptic)

Because LirOptic's lens can have an aperture size of less than 1 mm, both the lens and the housing/packaging that controls the lens can be far more compact, making it easier to integrate into products that require smaller footprints like medical devices, such as endoscopes.

By offering variable focal lengths, as opposed to a number of fixed focal lengths, the lens has the potential to reduce the number of cameras needed in smartphones to satisfy diverse user needs, from selfies and group shots to panoramic landscapes.

"Liquid lenses can be prone to leakage or degradation over time. This creates long-term reliability risks like mechanical fatigue or the sealing of fluids," Forsyth said. "Because we electronically control the shape of a lens, we eliminate the

need for liquids and moving parts. This enables us to create aspherical and arbitrary lens shapes with exceptional precision that are not impacted by gravity, vibration, magnetic interference, or ambient temperature—either hot or cold."

ENTERING THREE MARKETS, GAINING GLOBAL AWARENESS

The biggest application for LirOptic's technology is in the consumer electronics market, specifically cell phone cameras where the Compact Camera Modules (CCM) segment is anticipated to reach over $150 billion by 2028. In addition to enabling devices with fewer cameras and freeing up space for things like increased AI processing power and battery life, LirOptic envisions its technology will reduce the height of CCMs to allow for thinner phone profiles.

"We're currently working with a Tier-1, global consumer electronics manufacturer on a non-recurring engineering (NRE) project," shared Forsyth. "While we're continuing to work on the integration of our technology into consumer electronics, we're well aware that it will take time to fully design and then commercialize the offering."

To compensate for this reality, LirOptic's is tapping two smaller, yet more accessible and immediate market opportunities. First, it will sell evaluation kits to the estimated 10,000 optical research laboratories that exist across the world. Second, it's targeting the 3D medical imaging endoscopy sector, where their ability to offer an adjustable lens with an outer diameter of less than 2 mm is an industry game changer.

"Although these markets are relatively small compared to the CCM market, they give us the chance to build awareness and preference for LirOptic's technology with optical engineers and designers located all over the world," Forsyth said.

OVERSEAS RECOGNITION OF ROCHESTER'S OPTICS ASSETS

To advance their plans, LirOptic is in the process of raising €3m in funds and forging new partnerships.

"Applied Ventures suggested we apply to Luminate NY," stated Forsyth. "The accelerator's initial funding was attractive, but the main reason we wanted a spot in the competitive program was to tap into the optics, photonics, and imaging (OPI) ecosystem that exists in the U.S. In Ireland, we don't have access to the same kind of resources that exist in the Rochester region.

"We're now working with mentors and advisors who fully understand what we're doing from a technology perspective and have ideas for applications that we hadn't considered before. Being able to bring all of these people 'into our tent' to work on strategy and direction ensures that we choose the best path toward commercialization."

In addition to forging relationships with other cohort members and getting introduced to the U.S.-based venture capital community, LirOptic is also working with local vendors. This includes Rochester-based SimuTech, which is helping them develop a software "plug-in" that will enable optical designers to simulate the performance of a LirOptic lens on the Zemax platform.

"Our lens requires a number of different layers and patterns to be coated onto the substrate surface (differing thickness and make up). We're doing this work manually in our lab in Dublin right now. As we move toward mass production, we'll be looking at potential manufacturers within the Rochester region," Forsyth said.

MOVING FROM BATCH TO MASS PRODUCTION

"We're approaching a critical juncture in our development. Our lens technology is currently manufactured in Dublin in very small batches. So far, this has served us well. The next step will be to professionally manufacture the lens in larger volumes so that we can sell our evaluation kits.

"If we win follow-on funding from Luminate, it would help us to build our team and scale our manufacturing. Through our participation, it's abundantly clear that the real value of Luminate lies in the access it offers start-ups—to potential employees, consultants, advisors, manufacturers, suppliers, and investors," Forsyth added. We've been introduced to so many people and companies that can help us realize our goals in bringing this technology to market."

The companies of Luminate cohort 8 will compete for $2 million in follow-on funding at Luminate Finals 2025 on October 22. The program is funded by Empire State Development's Finger Lakes Forward Upstate Revitalization Initiative. For more information about the Luminate accelerator and Finals 2025, visit luminate.org.