

Liquid Crystal Technology



AlphaMicron – Kent, Ohio

Northeast Ohio Capitalizing on Unique Liquid Crystal Niche

OhioThird Frontier is strengthening existing and emerging technology clusters across Ohio by providing key resources to help make our state’s regional economies even more globally competitive. In Northeast Ohio, university and industrial collaborators have partnered with the OhioThird Frontier to establish the region as a global leader in liquid crystal technologies.

Currently, most of the world’s liquid crystal manufacturing, especially for large panel displays and monitors, occurs in the Asia-Pacific Rim. With assistance from OhioThird Frontier, **Kent Displays**, **AlphaMicron**, **Kent State University** and the **Northeast Ohio Universities College of Medicine and Pharmacy (NEOUCOM)** are conducting research to drive liquid crystal research and development, commercialization and manufacturing efforts. Rather than target display product markets already dominated by Asian manufacturers, these Northeast Ohio companies and institutions are focusing on niche-market product applications, including watches, electronic message boards and next-generation writing tablets, as well as other applications.

The **Liquid Crystal Institute** at **Kent State University** has grown into an invaluable asset for Ohio’s liquid crystal research and development capabilities. The institute is a key catalyst for technology commercialization, spawning companies and jobs for Ohioans, and has developed a reputation as a global leader in liquid crystal technology. Created in 1965, the **Liquid Crystal Institute** has become home to world-class researchers

and scientists, has attracted millions of dollars in Federal, State and other funding support, and is responsible for numerous discoveries and patents. Ohio Third Frontier funding has supported the replacement of conventional rigid liquid crystal display substrates with flexible plastic, as well as the replacement of expensive batch manufacturing with more efficient and cost-effective roll-to-roll processing.

Kent Displays, founded in 1993, and **AlphaMicron**, founded in 1997, are two successful spin-outs from the Liquid Crystal Institute at Kent State. The two companies now employ 56 and 35 individuals, respectively. The close proximity to the institute and the university benefit both companies significantly. Their focus on different markets, common manufacturing methods, and research interests has allowed them to utilize distinct synergies by forming a manufacturing alliance supported by common supply chain elements and sources of intellectual capital, including **Akron Polymer Systems**, the **University of Akron**, and **Kent State**.



Kent Displays – Kent, Ohio

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In September 2008, **Kent Displays**, through funding from the Ohio Third Frontier, installed a roll-to-roll production line to enable the manufacturing of its Reflex™ flexible displays technology. The first of its kind in the world, the production line enables **Kent Displays** to produce vast quantities of its flexible LCDs rapidly and efficiently. Production will eventually be operated by multiple work shifts and will increase the supply of flexible, low-power displays for product applications such as credit cards, product tags and other ePaper applications. **Kent Displays** has also ventured into next-generation writing tablets – offered in late 2008 and targeted towards teens and the back-to-school markets.

Adaptive Windows – containing self-regulating and electronically powered controllable tint – are being developed by **AlphaMicron** as a result of Ohio Third Frontier funding. The windows use **AlphaMicron's** liquid crystal technology, VALiD, to create an adaptive film that can be laminated to windows, assisting with the heating and cooling of buildings and increasing energy efficiency. **AlphaMicron's** technology is already being utilized in digital lenses for ski goggles, racing helmets, auto dimming mirrors in cars and motorcycles, fashion clothing, and the company's Tician line of eyewear.

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Kent State University and the **Northeast Ohio Universities College of Medicine and Pharmacy (NEOUCOM)**, in collaboration with **Pathogen Systems**, is further developing liquid crystal technology for pathogens detection. With support from the Ohio Third Frontier, this partnership focuses on the commercialization of a platform technology for a microbial pathogen monitoring system. The instrument can simultaneously detect and identify pathogens that could have adverse human health effects. This partnership will create a research lab as well as a manufacturing facility, which are expected to launch by 2010.



FLEXMatters Accelerator – Kent, Ohio

Furthermore, the region is working to leverage two of its strong industrial clusters to make them both more globally competitive. A partnership within **Kent State's Centennial Research Park** known as the **FLEXMatters Accelerator** is capitalizing on two Northeast Ohio strengths – liquid crystal research at **Kent State** and polymers research at the **University of Akron**. The Accelerator is combining Northeast Ohio universities' research and development strengths with the commercialization capabilities of regional companies to support existing jobs as well as create and grow new start-ups.

By combining a strong skilled workforce, world-class research, and commercialization efforts, Ohio Third Frontier is helping Northeast Ohio capitalize on its position as a leader in the liquid crystals industry.

Niche-Market Products for Liquid Crystal Technologies

- watches
- electronic message boards
- next generation writing tablets
- miniature security screens on credit cards
- electronic skin displays for mobile phones
- digital lighting control for lenses in ski goggles and eyewear
- auto dimming mirrors for the automotive and motorcycle industries
- energy efficient auto adjusting windows
- a detection and monitoring instrument for microbial pathogens