CMC MICROSYSTEMS IMPACT

A Need for Speed

High performance lasers address the global demand for connectivity

Dr. Lukas Chrostowski and his research team are working on projects in design, modeling, and nanofabrication of lasers, in particular, Vertical Cavity Surface Emitting Lasers (VCSELs).

It was the 1970's, and lasers were perhaps best known as part of the weaponry used by Luke Skywalker and his fellow Jedi as they battled the evil Darth Vader. But a young Lukas Chrostowski was learning about the power of lasers in a very different way—from his father, who brought them home from work to teach his son about the properties and value of the technology.

Today, Dr. Chrostowski attributes his passions for nanophotonics and other laser-related research to this early education, and has transformed a lifelong interest into a quest to make real gains in furthering computer and fiber technology for our future. After graduating from McGill University with a degree in Engineering, Dr. Chrostowski studied at the University of California, Berkeley with Professor Connie Chang-Hasnain, an expert in vertical cavity surface emitting lasers (VCSELs). Dr. Chrostowski is now an Assistant Professor with the Department of Electrical and Computer Engineering at the University of British Columbia, and is the co-director of the nanofabrication facility at UBC's Advanced Materials and Process Engineering Laboratory (AMPEL).

VCSELs are the smallest commercially available type of laser—in fact, they are so small that thousands can fit on one chip. They also require very low power to operate, which makes them useful for many situations. In high-performance computing, the use of VCSELs can result in faster integration between computers—this is especially vital for researchers who use vast amounts of computing resources to test theories on everything from black holes to blood flow. Chrostowski is also working on high-speed transistor micro-ring lasers, using CMC resources to integrate a high-frequency heterojunction bipolar transistor (HBT) to allow for very high-frequency modulation and integration with other optical components to increase speed without increasing costs.

CMC provides vital tools for Dr. Chrostowski's research, including design software that models the waveguides and designs the fabrication masks for on-chip optical interconnects. But the relationship ventures far beyond software resources. "CMC provides more than tools to further my research," says Dr. Chrostowski. "They offer the ongoing collaboration necessary for this type of technology to grow to meet the ever-evolving needs of microsystems research and development." *cmc*

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