



Pie Photonics' headquarters in Tullamore, Ireland.

Courtesy of Pie Photonics

OPTICS INNOVATIONS

Pie Photonics: Mobilizing Static Fiber Interferometry

Dominic Murphy

Tech advancements have led to miniaturized computers, phones and cameras, so why not interferometers? Dominic Murphy, CEO of Pie Photonics, describes how his fledgling company is devising mobile measurement solutions intended to displace larger systems.

I became smitten with interferometry, spectrometry and Fourier processing as an undergraduate at the National University of Ireland, Maynooth, where I earned a degree in physics and mathematics in 1996. During my third- and fourth-year projects, I measured photoelectric work functions, coded Fourier routines, and analyzed molecular spectra. This work inspired me to develop simple, mobile optical measurement devices.

I carried that vision throughout my graduate studies at the Waterford Institute of Technology, where I completed a Ph.D. in optical fiber interferometry, and into my early career. I worked in multiple engineering and research roles across startup, blue-chip and academic environments, exploring physical, chemical and biological sensing, telecommunications and astro-photonics. Working across disciplines informed

my practical approach to achieving simple, robust measurement solutions. It motivated me to found Pie Photonics, proving the maxim that opportunity lies at the interface.

In 2012, my wife Niamh and I set out to mobilize the power of interferometry as a “mom and pop” business team. Our core technology is the passive interferometer engine (Pie), which combines interferometry with optical fiber processing to measure frequency, phase, delay and amplitude for any narrow or broadband light source in a static, mobile unit—a kind of Swiss army knife for optical measurement.

Securing the right support and seed investment is considerably difficult for any hardware startup, but seeking funding in Ireland brings its own set of challenges. Food and agriculture are the primary mainstays in the country, although tech companies have made some inroads, particularly software developers. Hardware propositions remain a hard sell, however.

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For this reason, I headed stateside in October 2012 in search of American Pie! Our journey through the valley of death—a commonly used business term that refers to the difficulty of covering negative cash flow in the early stages of a startup—has been littered with minefields of bad deals, time-wasting “experts,” crazy numbers games and veiled-contract pitfalls. In order to establish a sustainable business, we needed to find the right supporters who understood what we were doing and contributed in an informed way.

Through my network of contacts, I ultimately secured support from a U.S. alliance of investors that shared our vision,

including Kigre Inc., a leading solid-state laser components company in South Carolina. Now that Pie is a reality, our supporters are delighted to hear the black-birds singing!

Using seed capital and production support from the United States, Pie’s first prototypes were designed and assembled between the converted attic and kitchen table of our family home.

Pie Photonics launched our portable static fiber interferometer and FT-spec-

trometer at Photonics West last February and was recognized with a Best New Technology Award at Pittcon in Philadelphia last March, when we brought three more products to market. Pie interferometers have been featured in several news and product focus articles in high-profile scientific magazines.

In November 2012, Pie moved to a 2,500 square foot facility in my hometown of Tullamore, in the heart of the Irish Midlands. From there, the Pie team has developed a portfolio of products, including the latest Super-Octave release “PieX,” a device about the size of a lunchbox that captures 700 nm of information with up

Courtesy of Pie Photonics



Dominic Murphy, CEO of Pie Photonics

URL

piephotonics.com

HEADQUARTERS

Tullamore, Ireland

CEO

Dominic Murphy

FOUNDERS

Dominic and Niamh Murphy

PRODUCTS

Miniature interferometers and FT-spectrometers

NUMBER OF EMPLOYEES

4

PARTNERS/ COLLABORATORS

Kigre Inc., University of Bath, Aston Institute of Photonic Technologies, ORC Southampton, VTT



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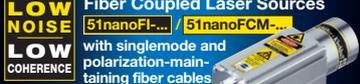
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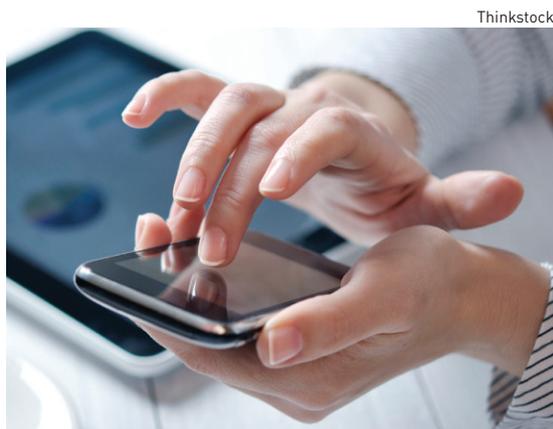


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“ Moving forward, we want to realize the ultimate in portability by integrating measurement technologies with smart phones. ”

— Pie Photonics CEO, Dominic Murphy

to 0.2-nm resolution in a single click, and other lightweight, low-profile, static technologies.

Our products include a range of end-user and original equipment manufacturer offerings that target growing, high-value applications, including fiber sensor interrogation for oil and gas, structural health monitoring and medical diagnostics. Our products' ability to measure optical delay, thickness, index and dispersion also makes them critical for the thin-film and optical coating industries, as well as the semiconductor and photovoltaic markets. In addition, our products are used to characterize lasers, fiber sources and LEDs. Future targets include LIBS, Raman and mid-infrared.

Moving forward, we want to realize the ultimate in portability by integrating measurement technologies with smart phones. We are

currently looking for strategic partners to develop a product line using this “MyPie” approach. Some proof-of-principle research has been carried out in collaboration with Tim Birks and Yong Chen at the University of Bath to investigate potentially suitable photonic crystal and multi-core fiber circuits for this purpose.

MyPie would open up mass consumer and diagnostic markets for Pie Photonics. In the fashion industry, sensors could be used to color-match fashion accessories and personalized cosmetics

based on skin tone. Within the realm of personal health, people could draw on a network of sensors that monitor specific conditions. Warning indicators of pollutants in air and water will also be possible.

For all of our customers, whether optical engineers or people looking to track their health or the environment, our company aims to make measurement as simple, mobile and convenient as possible—easy as pie! **OPN**

Pie Photonics is grateful for support from friends and colleagues, old and new, who have provided samples, access to equipment and helpful discussions. These include Piers Sazio and Noel Healy, ORC, Southampton; Lin Zhang and Zhijun Yan, Aston Institute of Photonic Technologies, Aston University; and Mikko Juuti, VTT Finland.

Dominic Murphy (dom@piephotonics.com) is the CEO and co-founder of Pie Photonics Ltd.