

GLOBAL OPTICS

# Optics at Shenzhen University

Guanxiao Cheng

Confucius asks, “When you have friends coming from afar, don’t you feel delighted?” For 30 years, China’s Shenzhen University (SZU) has been welcoming friends by developing global partnerships and educating students in applied optics and optical engineering.

**S**ZU enrolled its first class of students in 1983—the very same year it was founded—and invested heavily in creating and staffing state-of-the-art laboratories. Since then, the University has caught the attention of research and industry circles worldwide.

Shenzhen is located in the Guangdong province of China, which is close to Hong Kong. It has established dual-campus programs for undergraduate degrees with institutions in the United Kingdom, Sweden, the United States, Japan and South Korea. Teachers also participate in these programs.

The university’s optics program was launched in 1995 with the creation of the department of optical information science and technology (DOIST) within the College of Electronic Science and Technology (CEST). DOIST grants graduate and undergraduate degrees in optics to students with diverse academic backgrounds, including

physics, electrical engineering and optical engineering. Its main areas of focus are applied optics, optical engineering and micro-optics.

## Micro-optics

The emerging area of micro-optics is becoming more important in the industry as demand increases for compact designs and low manufacturing costs.

Micro-optical elements incorporate two or more surface levels with complex structures. Their relief profiles are etched into fused glass or embossed with polymer materials via photolithography and etching techniques.

Ping Xu and Hanben Niu’s research group is developing micro-optics for applications in biomedicine, informational optics and optical communications. Right now they are focusing their efforts on developing a new type of X-ray phase-contrast microscopy that enables non-invasive



## SZU in Numbers

**12.23** million CNY  
Total CEST research funds

**30,000** Number of  
on-campus students

**14,000** Number of  
off-campus students

**6,700** Number of  
students from countries  
outside China

**600** undergrads,  
44 M.S. and Ph.D. students  
and 9 postdocs at CEST

**39%** of faculty  
have worked or  
studied abroad



SZU campus.

Courtesy of Guanxiao Cheng

imaging at the subcellular and nanoscale levels.

Phase contrast is an excellent method for imaging transparent specimens (because it does not affect resolution) and studying dynamic events in living cells. Micro-optic technologies designed by scientists at SZU were used to develop specialized objective lenses for phase-contrast nano-imaging systems such as the Zernike apodized photon sieves (ZAPS) that investigate live samples. ZAPS overcomes halo effects, side lobes and alignment limitations that often come with ordinary X-ray Zernike phase-contrast microscopes.

Nano-microscopy based on ZAPS offers new opportunities for diagnosing cancer through optical biopsy and for assessing the growth, dynamics and behavior of a wide variety of living cells in culture.

With optics playing an increasing role in industrial research and development, many opportunities are popping up in Shenzhen and other cities in China.

### Serving industry and academia

With optics playing an increasing role in industrial research and development, many employment opportunities are popping up in Shenzhen and other cities in China. CEST maintains an industrial associates program to help place students within these companies.

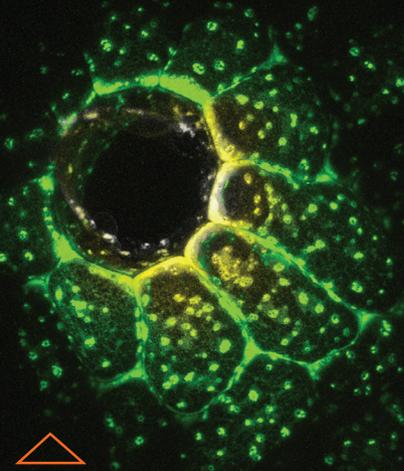
CEST is also committed to creating a new generation of optics professors, mentors and industry leaders who will help train the next generation of experts. Many graduates have been hired as faculty at SZU and other universities or have taken research positions at industrial and government laboratories. Others have started their own businesses or led major companies such as Han's Laser Technology, ZTE Corporation and Huawei.

Faculty take their role in training the next generation seriously, but we also take great joy in forming new friendships. To answer the question posed by Confucius: We are indeed delighted! **OPN**

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