

Practice in photonics education and training

Yonglin Zhang*^a, Hongwei Di*^a, Jingang Zhong*^a

^a Dept. of Physics, Jinan University

ABSTRACT

Photonics and photon technology play an important role in information technology and life science in the 21st Century. Jinan University always devotes itself to the training of the technicians in optics and photonics. We have founded the system of undergraduate and postgraduate courses and also built up the photonics technology major lab of Guang Dong Education Bureau. The research involves the optoelectronics detection, the image processing, laser biological effects, optical communications, and so on. Jinan University works hard to promote the industrial application of photonics technology. Jinan University is making its great contribution to the construction of Photon Valley of Guang Dong Province.

Keywords: course, laboratory, scientific research, Photon Valley of Guang Dong Province

Photonics and photon technology play an important role in information technology and life science in the 21st Century. In general, the previous stage of the development of photonics and photon technology is optoelectronics and optoelectronic technology. Both of them have been in rising development from the late 20th Century till now. They also have formed a great industry group and become an important economic mainstay. In the advance of science and economy, qualified technicians are critical. Jinan University is an overseas Chinese school, so, it is our responsibility to train the overseas and civil students. Jinan University lies in the Guang Dong Pearl River Triangle Square, so we think highly of the training and education of photonics according to the need of applied talents in the development of economy.

1. Educational Level and Course Arrangement

In Jinan University, the photonics education is composed of 2 parts: Undergraduate level and postgraduate level.

There are 2 majors in undergraduate level:

Applied Physics (science course) pays particular attention to the theory of photonics and devices aiming to train the students to be talented people.

Information Engineering (engineering course) pays particular attention to optical communications, optoelectronic information technology aiming to train the students to be senior technicians.

There are lists of courses as follow:

Applied Physics Major	Information Engineering Major
Basic Optics	Wave Optics
Laser and Modern Optics	Laser Principle and Devices
Optoelectronic Technology	Optoelectronic Technology
Fiber Optic Communications	Optical Fiber Communication
Basis of Photonics	System of Optoelectronic Information
Fiber Optic Technology and Application	Optical Communication Networks
Integrated Optics Technology	Technology of image Processing
Optoelectronic Information Technology Experiment	Optoelectronic Information Technology Experiment
Information Photonics Experiment	Information Photonics Experiment

Fig.1: Courses of the two majors in undergraduate level.

Applied Physics Major was founded in 1987 while Information Technology was built up in 1994. Many graduates are making their contribution to the society.

Commencing in 1983, the Master of Optics has trained about 50 postgraduates. Course structure is as follow (individuals can select their own program from the subjects on offer) :

Higher Optics	Principle of Photonics Devices and Technology
Quantumoptics and Statistic Optics	Integrated Optics
Optoelectronics and Optoelectronic Information Technology	Fiber Optic Communication Systems
image Processing and Analyses	Computer Networks
None-Linear Optics	Optoelectronic Technology Experiment
Photonics Report	Photonics Devices Experiment

Fig.2: Courses in postgraduate level.

The undergraduate and postgraduate courses aim to provide students with the basic principles and competitive skills. To reach this target, we designed every subject meticulously and made our effort to build up the laboratory.

2.the Construction of Laboratory

Optoelectronics and technology is a practical course. So the laboratory is critical. But the experiments didn't catch up with the advance of these kinds of subjects. Guang Dong Education Bureau started to construct a serial public major laboratories for improving teaching effects. Jinan University takes the responsibility to construct optoelectronic technology lab. This laboratory has been in use since Oct, 1998 after 3 years' efforts.

There are many characters in the laboratory:

- **Twelve experimental projects in total,composed of basic module and advanced module:**Basic module is used to make students grasp the characteristics and applications of typical optoelectronic devices(illuminating device,detecting device,image forming device,modulator,monitor).Advanced module is made up of several typical optoelectronic information systems.Every project is comprehensive.They involve the abstraction,storage,transmission,processing,demonstration and output of information,aiming to cultivate students to build up optoelectronic information system.Every project is creative too.Students can develop versatile programs through making good use of their soft ware and hard ware techniques and experimental systems.
- **The qualities of experiment items:** The knowledge is high and the technology is new. There are some contents emphasizing ability training designed by postgraduates. There are several levels of contents which are convenient for all kinds of students(undergraduates,postgraduates,teachers taking refresh courses, scientific research personnel) to select.
- **Laboratories constructed mainly by postgraduates :** All the experiment items in our photoelectron technology laboratory are designed and constructed by ourselves and most of them are changed from postgraduates' research achievements. The amount of constructing work is great, such as making hardware and software, adjusting system, compiling experimental teaching material. Full-time postgraduates organized into work have learned knowledge and improved abilities notably.

This laboratory is used not only to teach and research in colleges and universities but also to run technological training toward society. Since the year 1998 when the laboratory was built completely, many universities have come to visit and sent teachers and students to do experiment and ordered experimental systems. Optical society of Guang Dong Province have organized experts to visit the laboratory and held a symposium. They thought highly of our work.

3. Scientific Research Work

For many years, photoelectric detecting, image processing, laser biological effect, optical communication are the emphasis of our scientific research work. All of these are for the sake of promoting hard the practical application of

photonics technology, for example, photoelectric detecting used in 3-D shape measure having applied value in industry, combining photoelectric detecting with virtual instruments technology to develop equipment of detecting semiconductor laser's performance, wavelet transform used in biomedicine image processing, doing research in laser medical monitoring. All these tasks are completed by postgraduates under faculty members's guides. Postgraduates give free rein to their intelligences and abilities growing into outstanding talent thus the scientific research work is vigorous and achieves good results.

4. Working Hard for the Building of Photon Valley

In the year 2000, photon valley project was started up in Guang Dong Province. As the members of expert groups, the faculty of Jinan University takes part in the plan of photon valley and does positive contribution. For the sake of cultivating better talents for the photon valley and supporting business development, we have promoted the following work:

- Training classes for postgraduates majored in optics are runned. These courses are intended for personage of enterprises to engage in advanced studies after work. The content lay particular emphasis on fibre-optical communications and photoelectron technology.
- The laboratory of information photonics is constructed. It includes mainly optical fibre, fibre waveguide, optical communication components, system and network.
- For the sake of cultivating more validly talents of photonics, holding master institute and doctor institute of optical engineering is strived now.

The 21st Century coming, the development of photonics and photon technology is more rapid and achieves greater results. Through this meeting, we make academic exchanges with person of the same trade and try our best for cultivating more excellent talents.

*yonglinzhang@21cn.com; phone/fax 8620-85220233; Physics Department of Jinan University, 510632 GuangZhou, China