



**Photonics Packaging Workshop**  
28-29 May 2004,  
Room 418, Ho Sin Hang Engineering Building,  
The Chinese University of Hong Kong.



Co-sponsored by the **IEEE Lasers and Electro-optics Society** (Hong Kong Chapter) and  
Photonic Packaging Laboratory of **The Chinese University of Hong Kong**

**Registration Deadline: 21 May 2004**

**Registration Fee: HK\$250 (including lunch and workshop materials)**

Enquiries and registration: please send email to [hktsang@ee.cuhk.edu.hk](mailto:hktsang@ee.cuhk.edu.hk) with your contact details (name, organization and phone number).

Due to clean room space constraints the numbers attending the clean room session on Friday afternoon will be limited to 12 so please register early if you wish to join this session!

### **Introduction**

Packaging can take up the dominant part of the costs in a photonic component, and the package design and materials are critical in ensuring whether a photonic component passes qualification and reliability tests. Packages provide platforms for interconnecting or integrating different devices, and support the following major functions: distributions of optical and electrical signals, power delivery and heat removal, environmental protection and testing. The workshop will introduce the basic technologies for the packaging of photonic components such as laser diodes, planar lightwave components and MEMS components. The workshop comprises three main sessions: an introduction on the basic technologies and materials, a session to introduce the main practical issues in laser welding and fiber array attachment and finally a manufacturing and applications oriented session.

The workshop is aimed at graduate level engineers who wish to learn more about photonic packaging and its applications.

### **Schedule**

#### **Friday 28 May 2004**

9:00 - 10:30 **Introduction to Photonic Packaging Basics** Prof. S.H. Lee  
10.30 - 11.15 **Solder and epoxy material technologies** Prof Lawrence Wu  
11.15 - 11.30 Break  
11.30 - 12.15 **Flip Chip packaging for optoelectronic components** Dr Ming Li  
12.15 - 1.00 **Silicon based Planar Lightwave Components** Prof H.K.Tsang  
1:00 - 2:00 Lunch  
2:00 - 4:00 **Clean room demonstrations: Laser welding, fiber pigtailling etc**

#### **Saturday 29 May 2004**

09:15 - 10.15 **Case studies of photonic packaging technology and application** Prof.H. Liu  
10:15 - 11.15 **Packaging Challenges; a series of Packaging Engineering Services Case Studies** Sam Miller  
11:15 - 12.15 **MEMS for Optical Communication Networks** Prof.S.H. Lee

**END**

## **Photonic Packaging Workshop, 28-29 May 2004 - Summaries of talks**

### **Introduction to Photonic Packaging Basics**

**Prof S.H. Lee, Dept of Electrical and Computer Engineering, University of California San Diego**

In this presentation, we introduce the basics of photonic packaging. While photonic packaging technologies have developed in ways that are compatible with microelectronic packaging, the important differences between them will be examined. How different packaging technologies are applied to various photonic products for optical interconnects will be outlined. The usefulness of incorporating MEMS (micro-electro-mechanical systems) in photonic products, whose capabilities facilitate the explosive growth in bandwidth and networking features of light wave systems, will also be briefly introduced.

### **Solder and epoxy material technology**

**Prof C.M. Lawrence Wu, Dept of Physics and Materials Science, City University of Hong Kong**

Solder materials for photonics applications, considerations for soldering process, solder self-alignment and lead-free solders will be covered. The requirements for epoxies, common epoxies used, the curing process and reliability issues for photonics applications will also be introduced.

### **Flip chip packaging for optoelectronic components**

**Dr MingLi, Dept of Electronic Engineering, The Chinese University of Hong Kong**

We present an overview of challenges and issues in materials, processes and reliability tests for flip chip packaging of optoelectronic components. Several applications will be described, with particular emphasis on an integrated package using solder-bumped flip chip technique developed locally.

### **Silicon Based Planar Lightwave Components**

**Prof H.K. Tsang, Dept of Electronic Engineering, The Chinese University of Hong Kong**

The talk introduces the technology of silicon-on-insulator planar lightwave circuits (PLC) and their applications. Examples of issues that can arise during reliability tests will be discussed. The talk will also introduce some of the packaging facilities which will be demonstrated in the afternoon session.

### **Case studies of photonic packaging technology and applications**

**Hongdu Liu and Bernard Leung, Photonic Manufacturing Service Ltd.**

Examples of photonic packaging technology and applications will be presented, including PLC component on silica glass substrate, sub-system integration of silicon based polymer waveguide devices, and micro optic integration.

### **Packaging Challenges; a series of Packaging Engineering Services Case Studies**

**Sam Miller, Product Line Manager, Newport Corporation**

There are a diverse set of challenges facing a large array of manufacturers of optoelectronic devices. A brief overview of several examples will be presented. The examples will include: Study of the design requirements for passive alignment and attachment of single mode laser coaxial packaging; Fast Active Alignment in Photonics Device Packaging; A Simple technique for the alignment of Collimating lenses; and more.

### **MEMS in Optical Communication Networks**

**Prof S.H. Lee, Dept of Electrical and Computer Engineering, University of California San Diego**

The technology for Microelectromechanical system (MEMS) is one with the potential to impact a large cross section of science and engineering. In diverse activities such as the automotive industry, aeronautics, cellular communication, chemistry, acoustics, display technology, and lightwave systems, highly functional microdevices are establishing a large presence despite their diminutive size. In this presentation, we will discuss about some interesting MEMS whose capabilities can facilitate the explosive growth in bandwidth and networking features of light wave systems. Examples of MEMS will include variable attenuators, optical switches, add/drop multiplexers and active equalizers. Integrating MEMS in photonic products for optical interconnect presents additional packaging challenges.