

Technical Seminar on MicroTechnologies held on 30-Jan-07
 Participants: 23

Enrolment Form

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Position _____	Position _____
Name (English) (Mr./Ms./Ms./Dr.) _____	Name (English) (Mr./Ms./Ms./Dr.) _____
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Sponsors:

Technical Seminar on MicroTechnologies

Date : 30th January 2007 (Tuesday)
Time : 9:00 a.m. – 5:30 p.m.
**Venue : AG710, The Hong Kong Polytechnic University,
 Hung Hom, Hong Kong**
Fee : \$500.00 (Lunch Included)
Earlybird : \$400.00 (registration before 22 January 2007)

Miniaturization has stimulated immense interests in micro devices and MEMS in recent years. Latest survey predicts worldwide demands for 14 selected micro device groups will increase to US\$25 billion by 2009. Both consumer electronic and medical products will see a higher rate of growth in coming years. To get to know more some of the advanced technologies adopted behind this emerging industry, we are delighted to be able to invite honorable speakers in micro technologies to join us in this one-day seminar and to share with us the latest developments and how each of these technologies is applied to make micro manufacturing a new business opportunity.

Organized by **Microsystems Technology Centre**
 Department of Industrial and Systems Engineering
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Rapid Tooling for Micro Tools

— **Speaker : Mr. Michael Kuhl (9:30 - 10:45)**

Mr. Michael Kuhl is Senior Researcher of LaserTec GmbH, LaserTec is part of the Gildemeister group and has pioneered a laser micromachining technique called 3D ablation to create plastic injection moulds using a diode-pumped solid state laser with near infrared (1.06um) output. The special workstation controls and varies the delivery of the laser beam in three dimensions, including inclination of the laser attack angle. This allows shapes like spheres and cavities to be created, which would not be possible with conventional laser configurations with a fixed-angle beam.

With the use of new laser sources, it is possible to produce micro tools with laser ablation process. In particular, promising ablation is shown on diode pumped solid state laser. In the seminar, Michael will show the benefit and the limits of this development. He will discuss which influence the amount of process slag has, what is necessary to produce with the laser beam high precision micro parts and why a depth sensing system is necessary for exact tooling. Finally, the applications on different parts will also be shown.

A Low-Cost Micro Injection Molding Machine

— **Speaker : Professor K.L. Yung (11:00 - 12:15)**

Prof. Yung is Associate Head of the Department of Industrial and Systems Engineering of the Hong Kong Polytechnic University. His research has mainly been focused on precision engineering and system aspects of Computer Integrated Manufacturing and Management. He is the Principle Investigator of the R/F Project "Development of Miniaturized Micro/Nano-Injection Moulding" and "Development of Intelligent Active Mold Technology for the manufacturing of Micro-parts".

With the first high precision micro injection molding machine successfully developed in 2005, a new low cost version designed as an introduction and entry version for industry to acquaint themselves with the business opportunities in micro part manufacturing has since been developed. This new version inherits the same plasticizing screw, smallest of its kind, for dosage control, an independent, valve-less injection unit for shot consistency, and a tie-bar-less mold clamping system for efficient clamping but with reduced precision capability and for the low cost market. A prototype has been built and under tests. The speaker will describe the key design features, the machine characteristics and the molding test results. With the integration of a sprueless design, the injection characteristics has been greatly improved and its corresponding saving in material costs makes the machine even more competitive in the mass production of micro components.

High Pulse Energy Excimer Lasers for Precise Micro-Machining

— **Speaker : Dr. Burkhard Fechner (14:00 - 15:15)**

Dr. Fechner is Regional Sales Manager of Coherent, Asia. Coherent was founded in 1966 and has production and research facilities spanning the world, supplying everything from laser systems and components to laser measurement and control products and precision optics. Markets for Coherent's products include microelectronics, scientific research and government programs, materials processing, OEM components and instrumentation, and graphic arts and display.

Pulsed excimer lasers are the strongest and most efficient laser sources in the ultraviolet spectral region. Record short wavelengths from 351 nm down to 157 nm as well as record high 1200 mJ pulse energy are available for the 248 nm excimer lasers are commercially provided for numerous laser material ablation approaches.

Virtually no material is able to withstand the high photon energies ranging from 3.5 to 7.9 eV emitted by excimer lasers. As a result of the irradiation of material with high energy excimer laser photons of sufficient fluence immediate bond breaking due to electronic excitation is induced. In combination with short-term laser material interaction of only 10 to 30 ns excimer pulse duration, material ablation proceeds via fast vaporization and consecutive ejection of material with only negligible dissipation of heat transfer to the surrounding zone. The effect is an inherently precise and clean ablation quality.

Latest developments in excimer laser technology with particular respect to micro-machining and nano-technologies as well as applications will be discussed.

Micro Electroforming, an Amazing Technique for Micro Production

— **Speaker : Mr. Athanasios Kondomitsoz (15:30 - 16:45)**

Mr. Kondomitsoz is Managing Director of Mikro- und Oberflaechen Technik (MOT), a supplier of wet chemical turn key solution for MEMS and SEMICON applications, including electroforming systems and electrolytes. The processes possibilities of MOT for electroplating are for metals like Au, Ni and Cu, alloys like NiFe, NiCo, NiW and SnPb, and electroless plating of Ni, Cu, Au, and SnPb. The company has been in cooperation with IBM GmbH and Surtec GmbH for the development of many customized processes.

The speaker will talk about the possibility of using electroforming for the mass production of micro devices. There are two ways for the mass production. Direct production of metallic devices is one of them. The other is the replication of punching tool or mold insert for the mass production of micro parts as we see it in injection molding. The speaker will also address on some electroforming issues, mechanical properties and stress reduction of the formed layers.





