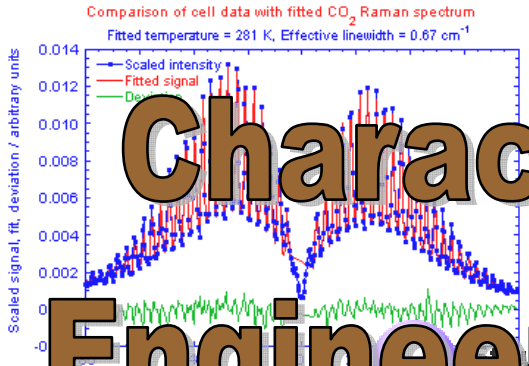
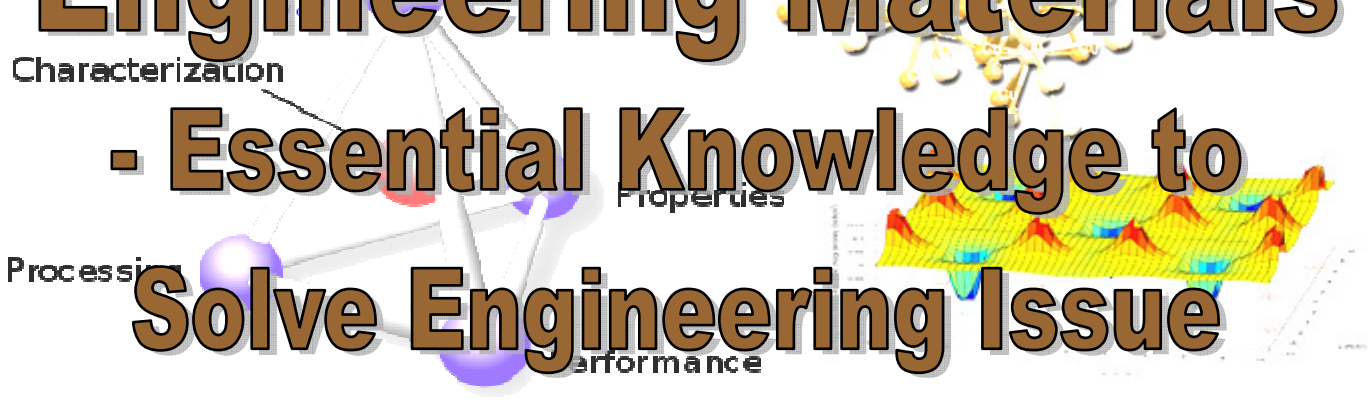
## 2-day course on

**HRDF CLAIMABLE***
*Subject to HRDF Approval




# Characterization of Engineering Materials - Essential Knowledge to Solve Engineering Issue




## WHO SHOULD ATTEND?

- Technicians, engineers and researchers
- Decision makers, policy makers, and managers

## PREREQUISITE

**Basic technical background or working experience in a science or engineering discipline.**

**Date** : **(i) 21 & 22 March 2012 or (ii) 10 & 11 July 2012**

**Venue** : **Kompleks Eureka, Universiti Sains Malaysia, Penang.**

**Time** : **9.00 a.m. – 5.00 p.m.**

UNIVERSITI SAINS MALAYSIA

**PUSAT PENGAJIAN KEJURUTERAAN BAHAN & SUMBER MINERAL**
**SCHOOL OF MATERIALS & MINERAL RESOURCES ENGINEERING**

in collaboration with:

USAINS HOLDING SDN BHD

(wholly-owned by Universiti Sains Malaysia)

## INTRODUCTION

Engineering materials are the core of any engineering products. The performance of the products is determined by the behaviour and characteristics of the designed materials according to their required specifications. Therefore, it is extremely important to understand the characteristics of the materials. This can be done by performing an appropriate and reliable characterization or testing on the materials. By doing that, information that is of interest namely electrical, mechanical, thermal, optical, and chemical property can be acquired and subsequently correlate with the product performance. To acquire this information, knowledge of characterization tools, limitation of the tools, and application of the tools is essential. By having this knowledge, it may help engineers and researchers to select a suitable tool for a specific purpose. The characterization techniques being introduced are suitable for materials with dimensionality ranging from nanometer to macrometer scale (or nanostructures to bulk materials).

## COURSE OUTCOMES

Upon completion of this course, participants will be able to:

- Discuss basic requirements of selecting a characterization tool.
- Relate concepts of materials properties with performance.
- Explain different types of characterization tools for acquiring electrical, mechanical, optical, and chemical properties of engineering materials.
- Compare the advantages and disadvantages of each tool.

## REGISTRATION FEE

(Covers training materials, refreshment including lunch and Certificate of Attendance)

**RM1,895.00 per participant**

**GROUP DISCOUNTS – RM1,705.00 per participant (minimum of 3 participants from the same company/organisation)**


**Technical Details:**
**Associate Professor Dr. Ir. Cheong Kuan Yew**
**School of Materials & Mineral Resources Engineering, USM.**
**04-653 3888 EXT 5259**
**cheong@eng.usm.my**

**Registration and others:**
**Khairol Anuar Hazir Mohammed**
**USAINS Holding Sdn. Bhd.**
**04-653 4372 / 012-286 9048**
**khairol@usainsgroup.com /**
**khairol_usains@yahoo.com**


## COURSE CO-ORDINATOR

**ASSOCIATE PROFESSOR DR. IR. CHEONG KUAN YEW**

Kuan Yew Cheong was born in Ipoh, Perak (1972) and received the B. Eng (1st Hons.) in Materials Engineering from Universiti Sains Malaysia (USM), Malaysia in 1997. After graduation, he worked for two years as a project engineer and quality assurance engineer in a project management company and a semiconductor-device manufacturing factory in Malaysia. End of 1999, he decided to pursue his postgraduate study (M.Sc.) after being awarded a Fellowship under the Academic Staff Training Scheme from USM. After completion his M.Sc. in Materials Engineering (Thin Film Technology) in 2001, he continued his Ph.D. in the School of Microelectronic Engineering, Griffith University, Australia and the degree was awarded in 2004. This study was fully sponsored by Australian Research Council, USM, and Griffith University Postgraduate Research Scholarship. In 2005, he was awarded a Certificate of Teaching and Learning from USM. Now he is serving as an Associate Professor at the School of Materials & Mineral Resources Engineering. He is teaching under- and post-graduate courses related to fabrication and characterization of engineering & electronic materials and devices for more than 7 years. Dr. Cheong's main research area is on semiconductor device fabrication, electronic packaging, and characterization. The outcomes of his research have been published in more than 85 high-impact-factor journals and 3 book chapters. Due to his expertise in wide-bandgap semiconductor-based device fabrication technology, and as a Professional Engineer registered under Board of Engineers (Malaysia), for the past six years, he has been invited three times as a Visiting Scientist to Korea Electrotechnology Research Institute (KERI), Korea. He has also being invited as an Invited Speaker and Keynote Speaker in International Conference on Electronic Materials 2010 (ICEM 2010) - International Union of Materials Research Societies (IUMRS), Korea, CIE & IEM International Seminar on Electrical, Electronic and Energy Saving 2010, Taiwan, and Infineon Technologies (Kulim) Sdn Bhd (IFKM) Technical Symposium 2010, Malaysia, and Surface Engineering 2011 at Bangkok, Thailand. Dr Cheong has served as a reviewer for numerous referred journals and examiner for theses. He has reviewed more than 220 manuscripts and now serves as an Editorial Advisory Board Member of *Materials Science in Semiconductor Processing* published by Elsevier Science B.V. Currently, he is being appointed as an External Course Assessor of Microelectronic and VLSI Design for Wawasan Open University, Malaysia.

Outside university, he is very active in professional and community activities. He is a member of Materials Research Society (USA). He was the honorary treasurer for Electron Microscopy Society, Malaysia for year 2005/2006. Since 2005, he has been elected as one of the Ex-comms of the Institute of Electrical, Electronic Engineers (IEEE) – Component, Package, and Manufacturing Technology (CPMT) Society and Electron Device Society (EDS), Malaysia Chapter. In addition, he is also the Chairman of the electronic engineering technical division (eETD) under The Institution of Engineers Malaysia (IEM) since 2009. He has been appointed as a Council Member of IEM and a Standing Committee on Qualification/Admission and Examination/Training. For the past years, he has involved in organizing a number of local and international conferences and being invited to chair a few technical sessions in those conferences. Dr Cheong, who is a certified PSMB Trainer, has been delivering technical training courses both locally and abroad for the past 5 years and more than 400 engineers and researchers have benefited from those training.

## CHARACTERIZATION OF ENGINEERING MATERIALS
## - ESSENTIAL KNOWLEDGE TO SOLVE ENGINEERING ISSUE
## PROGRAM SCHEDULE

### DAY 1

1. Introduction and general concepts

2. Mechanical Characterization
   - Tension testing
   - High-strain-rate testing
   - Fracture toughness testing
   - Hardness testing
   - Tribological and wear testing
   - Contact angle measurement

3. Thermal Analysis
   - Thermogravimetric analysis
   - Differential thermal analysis
   - Differential Scanning calorimetry
   - Thermal diffusivity measurement

### DAY 2

4. Electrical Measurement
   - Conductivity measurement
   - Hall effect measurement
   - Capacitance-voltage measurement
   - Current-voltage measurement
   - Deep-level transient spectroscopy

5. Optical Spectroscopy
   - UV-Vis Spectroscopy
   - Raman Spectroscopy

6. X-ray Techniques
   - X-ray diffraction

7. Chromatographic Techniques
   - High-Performance Liquid Chromatography (HPLC)
   - Gas Chromatography (GC)
   - Gas Chromatography-Mass Spectrometry (GC-MS)

**Previous participants:**

- International Islamic University Malaysia (IIUM)
- Agilent Technologies Microwave Products (M) Sdn. Bhd.
- Universiti Sains Malaysia (USM)

**REGISTRATION FORM**

# CHARACTERIZATION OF ENGINEERING MATERIALS
## — Essential Knowledge to Solve Engineering Issue

| DATE | CHOICE |
|---|---|
| **21 & 22 March 2012** | |
| **10 & 11 July 2012** | |

* Please tick (✓) where appropriate

**Send registration form to : Khairol Anuar, USAINS Holding Sdn. Bhd., Ground Floor, Kompleks EUREKA, Universiti Sains Malaysia, 11800 USM, PENANG. Fax : 04-657 2210 or Email : khairol@usainsgroup.com / khairol_usains@yahoo.com**

*Please register the following name/names*: (Please use separate sheet, if required)

| ITEM | PARTICIPANTS NAME | POSITION & EMAIL |
|---|---|---|
| **1.** | | |
| **2.** | | |
| **3.** | | |
| **4.** | | |
| **5.** | | |

| | | |
|---|---|---|
| **Industry Sector:** | | |
| **Company:** | | |
| **Address:** | | |
| | | |
| | | **Postcode:** |
| **Contact Person:** | | ***Mobile Phone:** |
| ***Telephone No.:** | ***Fax No.** | ***E-mail:** |

**Mode of Payment**

| | | | | | |
|---|---|---|---|---|---|
| I enclose | ☐ Crossed Cheque | Number | Bank | No. of Participants: | |
| | ☐ Bank Draft | | | Group Discount: | |
| | ☐ Money Order | | | | |
| | ☐ LO/PO | | | Total Sum: | **RM** |
| | | Payment must be made payable to '**USAINS HOLDING SDN. BHD.**'. | | | |

1. **Bank Transfer [P*lease fax your Bank-in Slip (Print your name & details on the slip)*].**
   Payee Name : **USAINS Holding Sdn. Bhd.**
   Details : **CHARACTERIZATION OF ENGINEERING MATERIALS - ESSENTIAL KNOWLEDGE TO SOLVE ENGINEERING ISSUE**
   Name of Bank : **CIMB Bank Berhad (USM Branch), Universiti Sains Malaysia, 11800 USM Penang.**
   Account Number : **0709-0006708-05-7**

2. **A Local Order (LO) or Purchase Order (PO) must be presented before the event.**
   The Organizer reserves the right to refrain a registered participant from taking part in the event if no proof of payment can be presented. This only applies to registered participants who have NOT paid the registration fee PRIOR to the event date.

3. **Cancellation / Substitution**
   A full refund less administration fee of RM500.00 will be given for cancellation received not later than **10 working days** before the course. No refund will be made after this period. However, substitute participants are welcomed at no extra charge provided written notice of at least **5 working days** before the event is given to the Organizer.