

A short course on  
**Mechanical Behavior and Fracture of Refractories**  
to be given on the occasion of UNITECR 2011 in Kyoto

Title: Mechanical behavior and fracture of refractories

This course will be given by:

Richard C. Bradt  
Alton N. Scott Prof. Emeritus  
Metallurgical and Materials Engineering  
The University of Alabama  
Tuscaloosa, AL 35487 – 0202, USA



Harald Harmuth  
Chair of Ceramics  
Department Mineral Resources & Petroleum Engineering  
The University of Leoben  
8700 Leoben, AUSTRIA



Date: Sunday, October 30th, 2011

Time schedule:

8:00-8:30	Registration of participants	
8:30-10:00	<u>1. Fundamentals of linear elastic material behaviour and fracture mechanics</u> Elastic properties of refractories, Youngs' elastic modulus of refractories and influences of microstructure, strength of refractories, stress intensity factor	Bradt
10:00-10:30	Coffee break	
10:30-12:00	<u>2. Fracture energies and fracture energy determination</u> Fracture energies of single crystals, crack initiation and total work of fracture of refractories, fracture energy determination and R-curve measurement, energy dissipation mechanisms in refractory microstructures.	Bradt
12:00-13:30	Break	

13:30-15:00	<u>3. Application of wedge splitting tests according to Tschegg for refractory characterisation</u> Testing procedure and specimen design, stability of crack propagation, evaluation of results, figures-of-merit, typical examples, fractographic investigation of crack paths, structure/property relationships.	Harmuth
15:00-15:30	Coffee break	
15:30-17:00	<u>4. Fundamentals of material models for thermomechanical refractory behaviour and its simulation</u> Mode I fracture behaviour and the fictitious crack model according to Hillerborg, material laws for multiaxial stress state, theoretical considerations regarding thermal shock, industrial examples of thermomechanical behaviour	Harmuth

Courseware: Attendees will receive written handouts.

Target group:

Engineers and scientists including master and doctorate students who can benefit from a deeper understanding of fundamentals of refractory behaviour; technicians from the fields of quality management, research, production of refractories and refractory application.

Registration fees:

JPY 70,000 per person

JPY 63,000 per person, if three or more individuals from the same facility will attend