

## Mini-symposium proposal

### MULTISCALE MECHANICS OF INTERFACES

#### **8th. World Congress on Computational Mechanics (WCCM8)**

**Venice, Italy**

(30 June - 5 July 2008)

#### **Organizer(s)**

Dr. C. Eberl (Post-doctoral Fellow, The Johns Hopkins University, USA)

Prof. A. Mukherjee (Director, Thapar Institute of Engineering and Technology, India)

Prof. Dr. rer. nat. S. Schmauder (Professor, Institut für Materialprüfung, Werkstoffkunde und Festigkeitslehre (IMWF), University of Stuttgart, Germany)

Dr. S.P. Joshi (Post-doctoral Fellow, The Johns Hopkins University, USA)

#### **Abstract**

Materials engineered for advanced technological applications comprise multiple phases or constituents in order to optimize their functional characteristics. Exemplar systems include: film-substrate architectures, omnipresent in thermal barrier coatings or integrated circuits and micro-electro-mechanical devices (MEMS), and particulate or fiber composites widely used in structural applications. In multi-material systems interfaces play a crucial role when it comes to structural integrity and reliability. Further, with advances in nanotechnology (e.g. nanoparticles or nanotubes in composites, and ultra-thin films in MEMS), interface energies play the governing role over the bulk response. It is imperative to accurately understand the role of interfaces in order to capture their structural response, especially failure.

The ability to predict the interfacial responses enables one to design these interfaces so that they perform their functions in a deterministic fashion. Computational mechanics, along with the vastly improved characterization techniques have opened new possibilities of engineering the interfaces by controlling the material behavior at different length scales.

This mini-symposium focuses on the modeling of the mechanical response of interfaces in heterogeneous materials. Specifically, the role of multiscale approach in cascading the interfacial information from one length scale to another is of interest. To this end, the mini-symposium will look for contributions involving interface mechanics addressed by ab initio methods, molecular dynamics, discrete dislocation dynamics, crystal plasticity, and continuum approaches involving cohesive zone modeling. Thin film-substrate arrangements, thermal barrier coatings, particulate and fiber reinforced composites are only few of the vast examples of interest. Of particular interest is the mechanics of interfacial adhesion in biological systems. It is expected that this mini-symposium will span the gap between fundamental (atomistic and molecular models) and applied sciences (engineering models) to derive improved understanding for the optimal design of heterogeneous materials.