



### DESIGN OF MATERIALS AND STRUCTURES USING TOPOLOGICAL INTERLOCKING OF THE BUILDING BLOCKS

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**Tuesday 29<sup>th</sup> July 2008, 4:00 p.m. – 5:00 p.m.**  
**Science Lecture Theatre S10**

A new concept of design of materials and structures, which is based on the use of fragmented systems consisting of identical elements interlocked within the assembly, will be presented. None of the elements (apart from those at the edges) can be removed from the assembly, which is achieved solely by virtue of the shape and arrangement of the elements. No connectors or binder are thus required in such structures, which enables great ease of assembly. This concept capitalises on the major benefit of fragmented structures – their tolerance to local flaws or failures and high resistance to crack propagation due to the presence of numerous internal boundaries. Several families of topologically interlockable elements will be discussed. The geometries include convex polyhedra, tubular elements and the so called osteomorphic elements, in which interlocking is achieved through matching specially designed concavo-convex surfaces. Topological interlocking is particularly attractive in design of hybrid materials, as elements made from different materials – regardless of how dissimilar they might be – can be mixed within a structure in arbitrary proportions and patterns. Possible applications of the design principle based on topological interlocking will be discussed in the talk, and exemplary results of studies of the mechanical response of model hybrid structures will be presented.

Visitors are most welcome: Please note the parking arrangements. There is a designated Visitors Car Park (N1) clearly ground-marked by white paint and tickets, at a cost of \$3/day, are available from a dispensing machine. ('Blue' permit designated areas are for Monash members only.). It is also possible to park at other designated Visitors Car Parks (E1, S1 and S2) on the Clayton Campus, but tickets are \$1.4/hour.

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