MONASH University

DEPARTMENT OF MATERIALS ENGINEERING

Seminar

PHOTOCHEMICAL AND THERMALLY ADAPTABLE NETWORKS

Prof. Christopher N. Bowman

James and Catherine Patten Chair and Professor

Associate Dean for Research, College of Engineering and Applied Science

Department of Chemical and Biological Engineering

University of Colorado

U.S.A.

Friday 6th February 2009, 3:00 p.m. – 4:00 p.m.

Engineering Lecture Theatre E7

Chemically crosslinked networks are generally described as thermosets, in recognition that these networks can be neither melted nor molded. In our research group, we have explored a new class of materials, known as 'adaptable networks', which implement reversible covalent linkages throughout the network backbone to facilitate controllable bond rearrangement and material reshaping. These linkages are activated either photochemically or thermally as in, for example, the photo-induced addition-fragmentation of the allylic sulfide functionality or the thermoreversible cycloaddition of furan and maleimide, respectively. We have explored both post- and during-polymerization stress reduction utilizing the allylic sulfide functionality within the network chemistry. The novel stress relieving properties of fully cured networks containing allyl sulfides within their backbone were demonstrated by the reshaping and even actuation of the material. Furthermore, we have studied the ability of the allyl sulfide functionality to undergo reversible addition-fragmentation chain transfer during photo-polymerization of thiol-ene monomers, allowing for stress relaxation via bond rearrangement in the latter stages of photo-polymerization (i.e., post gel-point). Thermally reversible Diels-Alder networks allow an avenue for complete reverse gelation, and are thus fully recyclable and can be 'healed' upon material cracking or failure.

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.

Convenor: Dr. Jian-Feng Nie

Tel: 9905 9605

Email: nie@eng.monash.edu.au