Photopolymerizations Center

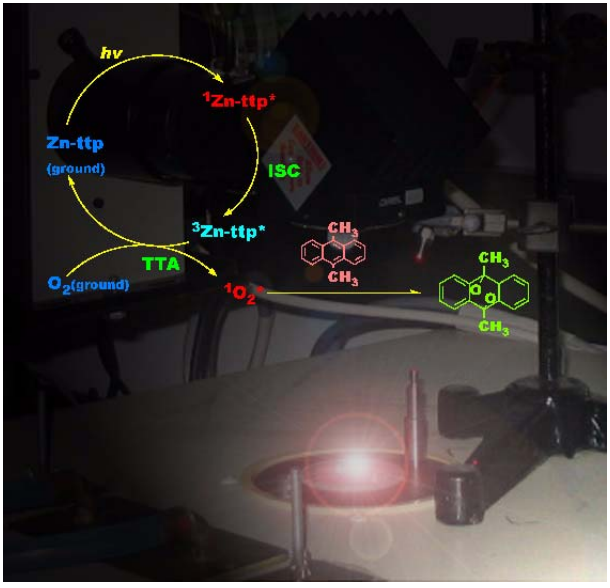
University of Iowa, University of Colorado

Dr. Alec Scranton, Director (UI)

Dr. Christopher N. Bowman (UC)

Phone: 319-335-1414
E-mail: alec-scranton@uiowa.edu

Improvement in Photo-Cured Acrylate Coatings



At the University of Iowa's Photopolymerizations Center, a photochemical method to eliminate oxygen inhibition in free-radical photopolymerizations has been developed by A. Scranton and group. This work provides a unique and practical solution to a major problem in photo-cured acrylate coatings: that curing is inhibited by air at the coating surface. Henkel Loctite Corporation expects this technology to be of significant commercial value.

For more information, contact Alec Scranton, 319-335-1414; e-mail: alec-scranton@uiowa.edu.

Energy-Efficient Adhesives and Coatings

Center research by C. Bowman and group at the University of Colorado has completed the most comprehensive study of thiol-ene photopolymerization kinetics yet undertaken. The findings provide a framework for the development of low-energy consuming adhesive and coating products and they represent a major advance in this field. For more information, contact Christopher Bowman, christopher.bowman@colorado.edu.

Ultra-Rapid Photopolymerization Method

Novel (meth)acrylate monomers for ultra-rapid photopolymerization have been developed by C. Bowman, University of Colorado. This program has identified and characterized several new monomers that provide highly photosensitive acrylate compositions with excellent physical and mechanical properties. These materials have potential for the design of improved structural adhesives in engineering applications. One application noted by UCB Chemicals is that of inks used in printing on food packages. Fast-reacting monomers can reduce both cost and food contamination. The fast-reacting monomers result in inks that dry faster and in packaging that is not as slippery, thereby improving the ability to stack packages. These two effects help reduce packaging costs. An added benefit to the fast-drying ink is that it does not seep through the packaging, and therefore does not contaminate food contained in the package with chemicals. For more information, contact Christopher Bowman, christopher.bowman@colorado.edu.

Dental Restorative Materials

Professor Bowman's research in the field of dental restorative materials has recently received a great deal of attention and numerous accolades. His research group has applied their expertise to address the ongoing issues associated with the high degree of polymerization shrinkage with highly cross-linked dental composites. The substantial shrinkage of these materials generates interfacial stresses between the restorative and the tooth structure. These stresses may lead to micro cracking of the restorative and tooth structure, microleakage at the tooth/restorative interface, and occasionally catastrophic failure of the restorative. Seminal efforts from Bowman's group utilizing a unique photoiniferter technique has shown that there is a direct correlation between the physical properties of the "cured" restorative and the degree of methacrylate conversion of the restorative--independent of the methodology used to achieve a given degree of conversion. Bowman's most recent efforts with Professor Stansbury has resulted in the collaborative development of an instrument to simultaneously measure degree of conversion and polymerization shrinkage stresses of polymerizable materials. This key effort will likely direct future shrinkage reduction efforts away from light exposure protocols and towards new chemical strategies. For more information, contact Christopher Bowman, christopher.bowman@colorado.edu.