

UNH Materials Science Seminar

11:00-12:00, Thursday, February 3, 2005
DeMeritt Hall 209B, University of New Hampshire

The Mechanical Properties of Inorganic Glasses

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Inorganic glasses have been found to be very useful prototypes for the study of the fracture of brittle materials. As such, they have frequently been used in this way since the classic 1920's work of A.A. Griffith. Also in the early 20's, a rather unrecognized, but very prescient work by Dalladay and Twyman measured the birefringence caused by residual stresses that resulting from a diamond scratch on the surface of an optical glass block. For 30 years after the work of Griffith, workers mistakenly pursued a search for so-called "Griffith flaws". Finally in the early 50's, studies by several workers showed that the dependence of strength on diameter that was the principal reason for the earlier studies was found to be an artifact of the glass preparation technique. On the other hand, no one followed up at all on the findings of Dallady and Twyman until the work of Arora, Lawn, Marshall and Swain in 1979. This is unfortunate, since it now seems clear that such studies of residual stresses can not only give very valuable insight into the general problem of cracking in brittle materials, but may be a major tool in the development of the more robust glasses that are needed for today's new devices. In this talk, we will review this history.

Biography

Dr. C.R. Kurkjian is currently a Visiting Scientist at Rutgers University, Dept. of Ceramic and Materials Engineering. He has degrees in ceramics from Rutgers University and M.I.T. After Postdoctoral fellowships at M.I.T. and the University of Sheffield, England, Dr. Kurkjian spent 35 years at Bell Labs in Murray Hill, N.J. During that time he did research in various areas of glass science and engineering, with a major effort devoted to the study of lightguide fibers. In 1999, after an additional 5 years with Telecordia Technologies, Dr. Kurkjian joined Rutgers University. His interests continue to be the mechanical properties and reliability of lightguide fibers, but he has recently made extensive measurements of both the intrinsic strength and indentation behavior of oxide glasses as a function of composition. Dr. Kurkjian is a Member of the National Academy of Engineering and the Academy of Ceramics, and a Fellow of the American Ceramic Society and the Society of Glass Technology. His awards include Distinguished Visiting Professor, American University of Cairo (1971); Visiting Fellow, Churchill College, University of Cambridge, U.K. (1978); National Academy of Sciences Visiting Scholar, former U.S.S.R. (1986); Morey Award, Glass Division, American Ceramic Society, (1987).