

George W. Morey Lecture

The George W. Morey Award is presented by the Glass and Optical Materials Division of ACerS and sponsored by Guardian Glass. The award recognizes new and original work in the field of glass science and technology. The criterion for winning the award is excellence in publication of work, either experimental or theoretical, done by an individual.

Title: Chemically strengthened glass: Science, technology and its future

Abstract: Glass can be chemically strengthened by immersion in a bath of molten alkali salt at temperatures lower than the glass transition temperature. An ion exchange between a small host ion, such as Na^+ , with a larger invading ion, such as K^+ , results in the development of high magnitude surface compression which strengthens the glass product. Except for some minor details, the science of stress development is now largely understood. Technology, on the other hand, is saddled with several nasty issues particularly relating to the degradation of the salt by increasing contamination and its periodic disposal. The consumer market is also somewhat difficult, particularly because of the perception that, upon strengthening, glass should be near-unbreakable. Despite these issues, many glass products are being, or could be, chemically strengthened. Examples are the high strength laminated windshields for aircraft cockpit, display windows in personal mobile electronic devices, packaging for parenteral drugs, vehicular transparencies, hurricane-resistant architectural windows, armor, large curved television, and thinner glass substrates for solar energy harvesting. This presentation reviews the science, the technology and the future outlook for chemically strengthened glass.