Abstract – "Varshneya Frontiers of Glass Science"

"What the Glass Transition Means to Me"

Anyone working with glass, from conventional silicate glasses, to metallic glasses, chalcogenide glasses, polymer glasses and simple organic liquid glasses, knows about the universal concept of the glass transition. All classes of glass exhibit a transition that is characterized using calorimetry or viscometry, and in many cases, molecular modeling. This fascinating transition that cannot be defined by equilibrium thermodynamics is described instead in terms of kinetics, structural relaxation, and inability to crystallize. To add to this mystery, there is the glass transition in sol-gel derived glasses and organic-inorganic gels. Especially in so-called melting gels that exhibit a glass transition at or below room temperature, and undergo reversible softening until final consolidation around 200°C, it is difficult to pin down exactly what is going on at the glass transition. By comparing behavior in melting gels to other systems, both organic and inorganic as well as composites, it is possible to draw analogies. Some speculation is offered in order to initiate a dialog and further this fascination with the glass transition.