Abstract Submitted
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The Defect Diffusion Model of Glass-Forming Liquids[1] JOHN FONTANELLA, Physics Department, U.S. Naval Academy, JOHN BENDLER, BSC, Inc., MARY WINTERSGILL, Physics Department, U.S. Naval Academy, MICHAEL SHLESINGER, Office of Naval Research — The defect diffusion model (DDM) provides an explanation of many properties of glass-forming liquids. For example, it has been used to interpret dielectric relaxation (alpha and beta relaxations and the boson peak), viscosity, ionic conductivity, (including the effects of temperature and pressure) positron annihilation lifetime spectroscopy data, the physical basis of fragility, scaling, the ratio of the apparent isochoric activation energy to the isobaric activation enthalpy and its relationship to monomer volume, and correlation lengths. In the model, the glass transition, Tg, occurs because of rigidity percolation. In addition the transition at T_B (or T_{LL}) is associated with mobility percolation. In the simplest form of the DDM, a supercooled liquid contains mobile single defects (MSDs) and immobile, clustered single defects (ICSDs). Consequently, dynamic heterogeneity is a natural feature of the model. If the glass transition did not intervene, all MSDs would disappear at a critical temperature Tc. In the present talk, the model will be used to comment on the change of heat capacity, thermal expansion coefficient and compressibility at Tg.

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John Bendler
BSC, Inc.

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