On the utility of topological principles for determining the fragility of network glass-formers

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Abstract

Models based on topological principles such as the rigidity percolation have been invoked to predict many physical properties of network glass formers such as density, relaxation, hardness as well as fragility. Here we investigate the structural, calorimetric and transport properties of four covalent and ionic network glass formers to examine the correlation between fragility and topology. It is found that topological principles are usually not an effective predictor of fragility although they can be useful in explaining some unusual behavior such as fragile to strong transitions. Instead it is found that structural and chemical contributions such as network dimensionality, chemical stoichiometry or structural heterogeneity have greater and clearer contributions to the fragility.

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