Abstract Submitted
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A configurational entropy theory for the non-Arrhenius relaxation in disordered systems[1] YIZHEN WANG, X. FRANK ZHANG, Bioengineering Program and Mechanical Engineering and Mechanics Dept, Lehigh University, JINXIU ZHANG, School of Physics and Engineering, Sun Yat-sen University, China — Here we develop a novel configurational entropy theory to explain the non-Arrhenius slowdown relaxation behavior in disordered systems on approaching the glass transition. The theory explicitly shows that this intriguing slowdown behavior originates from the growth in the configurational entropy loss (and the structural order degree) of the system, associated with the attractive interaction among relaxing units (RUs). A thermodynamic/kinetic equilibrium state with order singularity at the finite temperature T_c due to the attractive interaction among RUs is predicted. An expression is derived for characterizing the average relaxation time of RUs relaxing towards such equilibrium state. The resultant relaxation time expression offers a novel connection between kinetics and thermodynamics, different from that of the $A-G$ entropy equation, and it is shown to be a generalization of several well-known relations in current use. The theory also implies that the diverging relaxation time at finite temperature arises from the existence of an underlying long-range order phase transition at T_c. Our results could provide a novel understanding of the non-Arrhenius slowdown relaxation behavior in disordered systems on approaching the glass transition.

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