

Simple idea to solve Kauzmann paradox of glass transition phenomena

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In the traditional framework¹⁾ of glass transition phenomena, the slow dynamics of glass forming liquids has attributed to supercooling; Configurational entropy, which is an entropy difference between supercooled liquid and crystalline states, has been the issue of the discussion. But this framework propounds some critical problems including famous Kauzmann paradox²⁾. Furthermore, it cannot answer more essential question of how to apply thermodynamics to non-ergodic glass state. The scenario for glass transition phenomena has not been concluded.

Under this situation, we have constructed another scenario for glass transition phenomena³⁾, which is very different in its essential basis from the traditional one. We seek the origin of slow dynamics to liquid-liquid phase transition (LLT) not to supercooling. This scenario can solve the Kauzmann paradox. Furthermore, it is enable to give a clear meaning to fragility⁴⁾ index, whose entity has not been understood now. It predicts fragility index increases with pressure, which is consistent with the experimental result of liquid glycerol⁵⁾.

In this oral presentation, we focus on the discussion how this scenario is able to solve the Kauzmann paradox. Additional source of entropy which is derived from LLT is the key. We believe that our scenario can give a new perspective to understand glass transition phenomena. We are welcome many comments and criticisms on it.

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