The Glass Transition Within the Thermodynamics of Irreversible Processes

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The glass transition caused by a finite cooling rate is a continuous non-linear dissipative process whose description requires a clear distinction between equilibrium and non-equilibrium quantities. The so-called Davies or Prigogine-Defay relations (in form of an equation as well as in form of an inequality) are not relevant in such a process. The determining quantities of the glass transition are – from a macroscopic phenomenological point of view – the fluidity of the melt and the partial free enthalpy of the microscopic vacancies in the melt. All of the characteristics of the dynamics of the glass transition are essentially due to these two quantities.