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Progress in the Rheology of Inorganic Glass-Forming Melts

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In recent years, substantial progress has been made in understanding rheology of glass-forming melts. In my presentation I focus on some of crucial developments in studies of the viscous behavior of inorganic melts. I describe new insights into the correlations among the liquid dynamics, thermodynamics, equilibrium viscosity, non-equilibrium viscosity, and non-Newtonian viscosity. I address the role of the new knowledge about the melt rheology in influencing the glass technology by giving several examples. Furthermore, I attempt to establish the link between the melt fragility and the technological aspects such as the melt workability, fiber spinnability, and glass forming ability. I also briefly mention which of the current viscosity models has both physical foundation and highest accuracy in describing the temperature and deformation dependences of viscosity. The impact of the glass structural anisotropy due to tension on mechanical strength has been demonstrated and elucidated. Finally, I report a recent finding about the dynamics of metallic glass-forming melts.