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The impact of pressure on dynamic properties in glass forming systems

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In glass forming systems, including low molecular weight liquids, resins and polymers, the increase of Pressure (P) most often increases that Glass Temperature (T_g), i.e. $dT_g/dP>0$ not with standing, there is a notable minority of systems where the opposite behavior takes place, i.e. $dT_g/dP<0$. This contribution presents the uniform way of portraying both mentioned cases, indicating that the maximum of $T_g(P)$ may be a general feature although it can be hidden in the negative pressures domain or under extreme pressures. Subsequently, the issue of the isothermal, pressure parameterization of viscosity ($\eta(P)$), relaxation time ($\tau(P)$), electric conductivity ($\sigma(P)$), …in the previtreous domain is addressed. First, the generalized pressure counterpart of the Vogel-Fulcher-Tamman (VFT), able to penetrate also into negative pressures domain, is discussed. Second, the preference for the critical like description for some glass formers (including selected polymers) is shown. Finally, the new explanation for the puzzling problem of the inflection phenomenon for previtreous effects of mentioned properties ($\eta(P)$, $\tau(P)$), $\sigma(P)$) is presented. The discussion is supported by experimental dependences obtained via the broad band dielectric spectroscopy studies up to extreme 22 GPa. We stress the significance of results obtained for the fundamental insight into the glass transition phenomenon, considered as one of grand challenges of contemporary physics, and also for variety of applications – including ones dealing with 'plastics'/polymers and foods packaging.

Biography

Aleksandra Drozd-Rzoska has completed her PhD in 1998 from University of Silesia, Actually, she is the Researcher in the Institute of High Pressure Physics PAS, Warsaw, Poland. She has published more than 100 papers in reputed journals, few patents related to foods and related under pressure, Co-Editor of two books.

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