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Title:Nonergodicity factor, fragility, and elastic properties of polymeric glassy sulfur

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Abstract:We present a detailed investigation of the vibrational dynamics of glassy sulfur (g-S). The large frequency range spanned in this study has allowed us to carefully scrutinize the elastic properties of g-S and to analyze their relation to various features of both the glassy and the liquid state. In particular, the acoustic properties of g-S present a quasi-harmonic behavior in the THz frequency range, while at lower frequency, in the GHz range, they are affected by a strong anharmonic contribution. Moreover, the high frequency (THz) dynamics of g-S does not present signatures of the elastic anomalies recently observed in a number of glasses. Despite this apparent contradiction, we show that this finding is not in disagreement with the previous ones. Finally, by considering the correct long wavelength limit of the density fluctuations in the glassy state, we estimate the continuum limit of the nonergodicity factor and we investigate recently proposed relations between the fast dynamics of glasses and the slow dynamics of the corresponding viscous melts.

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