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Crystallization kinetics of novel multifunctional glasses for IR photonics LEO SATURDAY, ROMAN HOLOVCHAK, CAMERON JOHNSON, Austin Peay State University Department of Physics and Astronomy, YAROSLAV SHPOTYUK, Université de Rennes — Chalcogenide glasses (ChG) are an efficient medium for applications in modern photonics: combining high IR transparency, excellent fiber-drawing capability, and the largest optical nonlinearities reported to date. Nanomodifications of ChG could open the possibility of designing hybrid-materials, combining two or more useful properties in one functional medium. In this regard, several elements are found to modify ChG at the nanoscale. Rare-earth dopants are able to enhance the properties of ChG, allowing for applications as an active medium for optical sensors, lasers, optical amplifiers, and broad band sources in the mid-IR spectral range. In this work, we report thermal stability and crystallization kinetics studies for glasses of the $Bi_xGa_y(GeSe_4)_{50-(x+y)/2}(GeTe_4)_{50-(x+y)/2}$ family, which are anticipated to be used as a host matrix with the potential to combine multiple features in one medium. Crystallization of at least three different phases is identified using differential scanning calorimetry (DSC). The Dietzel criterion of glass stability is determined, and the activation energies for each crystallization process are calculated. The applicability of the Johnson-Mehl-Avrami (JMA) relation to describe the crystallization kinetics is verified using J. Malek's approach.

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