

08-015

Glass relaxation well below T_g observed by three experimental techniques

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Understanding the relationships between structure, relaxation and crystallization phenomena of vitreous materials are key issues of glass science. Given enough time at any temperature below or above the laboratory glass transition (T_g), the glass structure changes seeking configurations of (intermediate) lower energy before crystallization. This process is called glass relaxation. In this work, splat-cooled diopside ($\text{CaMgSi}_2\text{O}_6$) glass specimens have been heat-treated at 170°C below T_g up to 100 hours and the subsequent changes in glass properties have been observed with three different experimental techniques: FTIR, DSC and a polariscopic semi-quantitative analysis. The acquired data was fitted with the Kohlrausch expression resulting on the phenomenological relaxation time and its stretching exponent. Contrary to common belief, the combined results indicate that it is possible to detect relaxation phenomena well below T_g in laboratory time scales.