Structural, mechanical and optical properties of glasses within the TeO2-TiO2-ZnO ternary system

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Abstract

Tellurium oxide glasses have a lot of scientific and technical interests due to their superior physical and chemical properties such as high refractive index, high dielectric constants, a wide band infrared transmittance, a low phonon energy and large third order non-linear optical susceptibility [1].
This work will focus on TeO2-TiO2-ZnO ternary glassy system which has been previously studied because both addition of TiO2 and ZnO is known for given very stable glasses having high polarizability and hyperpolarizability [2] and they are also reported as good candidates for ultra-low loss [3] optical material.

In this communication, we will present a new approach of understanding of medium range order structure of these glasses. In fact, we studied both the structure of the glasses by in situ Raman spectroscopy as a function of temperature and especially around the glass transition temperature (Tg) and the mechanical properties by Resonance Frequency Data Analysis (RFDA) experiments [4-5]. This work will evidence the link that we can point out from those two complementary approaches and will propose a new point of view on the correlation between mechanical and structural properties around Tg which could be a key point for the optical fiber shaping. Non-linear optical properties obtained by Z-scan experiment, will also be presented to evidence the huge interest of those glasses [6].

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