

SECOND HARMONIC GENERATION IN GERMANO-TELLURITE GLASS CERAMICS

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Abstract

Aiming the fabrication of glass ceramics with high optical nonlinearity, tellurite and germanotellurite based glasses are potential interesting glassy systems because of their high refractive index combined with low phonon energy. Nevertheless, to engineer a new optical glass ceramics, it is necessary to control first either surface or bulk crystallization and second sizes and orientation of the crystallites within the glass matrix. In this study, a glass system of composition 70TeO₂ – 10 GeO₂ – 10Nb₂O₅ – 10 K₂O – x Ag₂O (x=0 – 6%) has been investigated. Silver cations have been introduced in the composition to play the role of nucleating agents with the aim to control the volume crystallization. Thermal analysis and X-ray diffraction measurements have shown the precipitation of a unique crystalline phase: K[Nb_{1/3}Te_{2/3}]₂O_{4.8}. Second harmonic generation responses of the glass ceramics have been also investigated at the microscopic scale using μ Raman/ μ SHG correlative technique and at the macroscopic scale with the classical Maker fringes experiments. Such a multi-scale approach has permitted to correlate symmetry, size and organization of the crystallites within the glass matrix to the macroscopic second order optical properties of the composite glass ceramics.