

Abstract Submitted
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Characteristics of a Cr⁴⁺-doped glass-ceramic; a new material for photonic devices L.L. ISAACS, The City College of New York and the Graduate School of The City University of New York, New York, NY 10031, A.B. BYKOV, V. PETRICEVIC, I. POPOV, M. YU. SHARONOV, J. STEINER — The compound 1.0(Cr-doped Ca₂GeO₄)-1.0(Li₂O)-0.2(Al₂O₃)-0.5(B₂O₃), on quenching from the melt and subsequent heat treatment, yields a transparent glass-ceramic. The nanocrystallites formed by the ceramming procedure are distributed homogeneously in the bulk. Differential scanning calorimetry was used to determine the glass to crystal transformation temperature, T_g, and its dependence on heating rate. The activation energy for the glass to crystallite nucleation is 62kJ/mol. The calculated Avrami exponent is 1, in agreement with scanning electron microscopy observations. X-ray diffraction data indicates that the structure of the nanocrystallites is that of distorted Cunyite (Ca₂GeO₄). Electron microscopy indicates that the crystallite sizes are less than 1μm. The growth mode of the crystallites is “needle” like. The material exhibits broadband emission between 1050 to 1600 nm, with a maximum at ~1260 nm. The spectroscopic and optical properties indicate, that this material is a promising candidate for use in microelectronics, micro lasers and as fiber optic transmission lines.

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