

Er/Pr-codoped borotellurite glasses as efficient laser operated nonlinear optical materials

ABSTRACT

We have discovered a rare opportunity to operate by the SHG at fundamental wavelength 10.6 μm of microsecond CO₂ laser during simultaneous irradiation by 1064/532 nm bicolor laser beams of (60-x-y)TeO₂-10B₂O₃-10BaO-10ZnO-10Na₂O-(x)Er₂O₃-(y)Pr₆O₁₁ (x = 0.5, 1.0; y = 0); (x = 0; y = 0.1, 0.2, 0.3, 0.4, 0.5); (x = 0.5, 1.0; y = 0.1, 0.2, 0.3, 0.4, 0.5) (mol%) glasses. The effect has shown a drastic sensitivity of the effect to the Er/Pr ratio. The effect exists only during the simultaneous illumination and applied dc-electric field at 5 kV/cm. Only completely reversible changes were observed. The effect is a consequence of photopolarization during the bicolor coherent laser beams and its efficiency is determined by the transfer of excitation between the Er and Pr ions.

Keyword: Borotellurite glass; Er³⁺; Pr³⁺; XRD; TGA; Bicolor laser treatment