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Temperature-dependent spectroscopic properties of Tm³⁺ in germanate, silica, and phosphate glasses: A comparative study

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Spectroscopic properties of thulium-doped germanate, silica, and phosphate glasses were measured and compared since such glasses are of interest as materials for fiber lasers in the eye-safe wavelength region. ³F₄ excited state fluorescence decay dynamics was investigated at temperatures from 8 to 300 K and the results revealed a strong dependence of the ³F₄ lifetime on the host matrix. The temperature-dependent stimulated emission cross section was obtained by using the Fuchtbauer-Ladenburg technique. In phosphate glass the fluorescent lifetime is short, making this material difficult to use for 2 μm laser purposes. Tm³⁺-doped germanate glass shows a longer lifetime than silica, a comparable value of stimulated emission cross section and some interesting temperature-independent properties.

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Other solid inorganic materials

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