A 1.9μm THULIUM DOPED LEAD GERMANATE WAVEGUIDE LASER

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Tm^{3+} doped lead germanate glass has already been shown to be a promising source of 1.9μm radiation using the $^3H_4$ to $^3H_6$ transition in a fibre geometry[1]. The maximum vibrational energy of these glasses lies between that of silica and heavy metal fluoride glasses. This increases the radiative lifetime of the upper laser level in comparison to silicates while increasing the multiphonon non-radiative decay from the $^3F_4$ pumping level into the upper laser level in comparison to fluorides. Thus the 1.9μm Tm^{3+} laser performance is enhanced in these glasses bringing fibre laser thresholds easily within reach of diode pumping. Recent work has also shown that such glasses give very low propagation loss guides (0.15dB/cm) when implanted with He ions[2]. Here we report lasing in a planar ion-implanted waveguide in Tm-doped lead germanate. This is the first report of lasing for thulium in any planar waveguide system and this is also the longest wavelength so far reported for such systems. This is also the first report of lasing in a glass host using ion-implantation as the means of waveguide fabrication.

Some potential advantages over fibre devices are the compactness (a 1cm device was used in this work) and the ease of access to the guide region. Compatibility with side-pumping, using a diode bar, is another area of potential interest[3]. Immediate plans are to fabricate channel waveguides and it is intended that a detailed comparison of performance against corresponding fibre devices shall be reported.

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