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## Research progress on metal ions doped lithium tantalate crystals and their applications in green laser

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Lithium tantalate (LT) is one of the most promising nonlinear optical materials. However, the low optical quality and damage threshold limits its application in photonics. Therefore, growth of MgO doped LT and stoichiometric LT has become a hot research topic. Nd, Mg co-doped LT possess improved laser properties and these metal ions would help eliminate anti-site defect in crystals which affect the physical properties largely. However, the doping homogeneity is still a key factor which determines the quality of the crystals. Therefore, we focused on the research of crystal growth, ions doping and physical properties of lithium tantalate for years. We obtained MgO doped SLT and Nd, Mg co-doped CLT crystals with high homogeneity and great optical properties. We studied the anti-site defects in crystal lattice and elimination method. With the Nd, Mg co-doped CLT crystal, a CW laser output power of 3.58 W was achieved. A green laser with multi-wavelength emission was demonstrated using intracavity frequency conversion (frequency doubling and frequency summing) in a Nd:Mg:LiTaO<sub>3</sub> laser. MgO-doped periodically poled lithium niobate (MgO:PPLN) was used as a nonlinear crystal in this work. Moreover, a 62mW that could emit light at 546, 542 and 538 nm was obtained by end pumping with a 808-nm laser diode. The speckle contrast ratio for the three-wavelength laser was only 3.36%, a quarter of the value of the conventional 532-nm laser, which showed that a multiwavelength broadband laser is an effective way to reduce the speckle noise in a laser projection display.

### Biography

Kang Xueliang received his Bachelor's degree at Shandong University in China in 2012 and has been studied in Institute of Crystal Materials of Shandong University as a Post-graduate student since then. His research focused on the growth, structure and physical properties of lithium niobate crystal and lithium tantalate crystal. He has published several literatures in some important journals.

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