THz DIFFERENCE FREQUENCY GENERATION FROM DASC AND DAST USING A CR:FORSTERITE LASER

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The tunable coherent terahertz (THz) wave source is one of the key devices for THz applications such as frequency domain spectroscopy and multispectral imaging. Recently, THz-wave radiation from nonlinear optical (NLO) crystal via difference frequency generation (DFG) has been extensively studied as a tunable coherent THz–wave source. Especially, 4-dimethylamino-N-methyl-4-stilbazolium tosylate (DAST) and DAST derivative organic NLO crystal, 4-dimethylamino-N-methyl-4-stilbazolium p-chlorobenzenesulfonate (DASC) are of great interest because of their wide tunability and high conversion efficiency. Therefore, it is important to research the details of the THz-DFG from those crystals such as the damage thresholds and the thickness dependences. In this study, we have investigated THz-wave radiation from DASC and DAST crystals via DFG process excited by a Cr:Forsterite laser. As for the results, the frequency ranges of the tunable THz-waves generated from the crystals were 1.8 to 7.5 THz from the 0.5 mm thick DAST crystal and 1.6 to 8.5 THz from the 0.1 mm thick DASC crystal. Considering the thickness of the crystals, the conversion efficiency of the DASC crystal is at least that of DAST crystal. Both crystals were damaged with the irradiation of a high power pump laser and the powers of the THz-wave radiations decreased after the damages. The damage thresholds of the DAST crystal and the DASC crystal were calculated to be 20 J/cm^2 and 27 J/cm^2 from the pump laser energy dependences of the THz-wave energies.

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