Correspondence

Correction to "Relative Measurement of the Optical Nonlinearities of KDP, ADP, $LiNbO_3$, and α-HIO_3"[1]

TABLE I
THE RATIOS d/d' OF THE NONLINEAR OPTICAL COEFFICIENTS FOR THE VARIOUS CRYSTALS

		d'			
	d	d_{36}(KDP)	d_{36}(ADP)	d_{14}(HIO_3)	d_{31}($LiNbO_3$)
d	d_{36}(KDP)	1	0.97 ± 0.16	0.098 ± 0.019	0.092 ± 0.015
	d_{36}(ADP)	1.03 ± 0.16	1	0.101 ± 0.014	0.095 ± 0.009
	d_{14}(HIO_3)	10.2 ± 1.9	9.9 ± 1.4	1	0.94 ± 0.13
	d_{31}($LiNbO_3$)	10.9 ± 1.7	10.5 ± 1.0	1.06 ± 0.15	1

In the above, the values reported for the relative optical nonlinearities must be modified for two reasons. First, I neglected crystal absorption. This is not justified for 1.15-μ radiation in ADP and KDP. Consequently, $f(\sigma)$ in (1) should be replaced by $G(t, q)$ as defined in [6]. For the ADP crystal the expected second-harmonic power is reduced by 0.82, whereas for the KDP crystal it is only reduced by 0.97. Secondly, a previously undetected overlapping of the 1.15-μ SHG line with the 1.15-μ + 1.16-μ line in the KDP crystal was discovered. It is not possible to exactly account for this overlap without repeating the measurements, preferably with a single line laser. Nonetheless, it is possible to analyze the situation using the known approximate distribution of power among the various lines of the laser. Such calculations indicate that the measured power was 1.2 ± 10 percent larger than the actual 1.15-μ SHG. As one result of these corrections, d_{36} in ADP and KDP now appear roughly equal. The corrected values for all the relative optical nonlinear coefficients are shown in Table I.

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Notes and Lines

Laser-Pumped Dye Lasers Near 4000 Å

We have obtained laser action near 4000 Å by pumping solutions of organic scintillator fluors with the second harmonic of a Q-switched ruby laser. The dyes are commonly used as spectrum shifters in scintillation counting [1], [2]; four of the compounds, α-NPO, BBO, POPOP, and dimethyl POPOP, belong to the oxazole group. Several workers have previously used the output of a laser [3]–[5] or its second harmonic [6] to pump a dye laser. The shortest wavelength previously reported for a dye laser was 4326 Å, obtained by pumping 9, 10-diphenylanthracene with the second harmonic of a ruby laser [7].

In our experiments the second harmonic of a Q-switched ruby laser was generated in a KDP crystal and focused by a 3-cm-focal-length cylindrical quartz lens to a line ~ 8 mm long just inside a 1-cm-long spectrophotometer cell. The second-harmonic power was approximately 0.8 MW (10 mJ in a 12-ns-wide pulse). The dye cavity, whose axis was perpendicular to the direction of propagation of the pump light (transverse pumping), consisted of a flat dielectric-coated 100 percent reflector and a 2.15-meter-radius output coupler separated by 18 cm. The reflectivity of the output mirror varied through the wavelength region of interest; measured values are given in Table I. The output spectra were obtained using a Jarrell–Ash Model 75000 grating spectrograph with a dispersion of 20 Å/mm in second order. The time dependence of the output pulse was observed with an ITT FW-114A photodiode with an S-20 spectral response and a Tektronix 519 oscilloscope. With this system, which had a rise time less than 0.5 ns, we observed that the dye-laser pulse closely followed the time development of the pump pulse.

The dyes, obtained from Pilot Chemical Company, were used in solutions that had not been de-oxygenated. Elimination of possible oxygen quenching might improve the performance of the solutions [1], [2]. The fluorescence properties of all the dyes except bis-MSB

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