

## Cr:Ca<sub>3</sub>(BO<sub>3</sub>)<sub>2</sub> Crystal; a New Medium for Mid IR-Lasers

유영문<sup>1</sup>, A.Y.Ageyev, 정석종

한국화학연구소

<sup>1</sup> ymyu@pado.kriect.re.kr

New single crystalline materials doped with Cr<sup>3+</sup> ions are, at present, lots of attractive for the purpose of room temperature tunable solid state lasers with emission in IR spectral region. For the first time in the world, we report on the growth of new Cr:Ca<sub>3</sub>(BO<sub>3</sub>)<sub>2</sub> (CaBO) laser crystal.

Ca<sub>3</sub>(BO<sub>3</sub>)<sub>2</sub> crystals were grown by Czochralski method from the melt contained in 50x50 mm Iridium crucible. Continuous flow of N<sub>2</sub> gas atmosphere was used. Because CaBO melts congruently, it can be grow from stoichiometric composition. The starting material was prepared from CaCO<sub>3</sub>, Cr<sub>2</sub>O<sub>3</sub> and B<sub>2</sub>O<sub>3</sub> powders with purity 99.99%. The melting point of CaBO is near 1550 °C. The rotation and pulling rates were 10 rpm and 1~1.5 mm/h respectively. Because CaBO crystal has strong cleavage plane along (001), preferable direction of growth is (001). Crystal orientation was determined by x-ray single crystal diffractometer and polarizing microscope using conoscopy method. The CaBO powder X-ray diffraction pattern was measured (Fig.1) and then indexed to Rhombohedral system (Table. 2). The unit cell dimensions were calculated to a= 6.3548Å and α= 85.51° by least square method.

Cr:CaBO crystal shows promising spectroscopic properties as a broad and continuously tunable infrared laser. Our efforts are continuing to grow high quality of laser crystals doped with 3% of Cr ions. Spectroscopic and laser properties of CaBO will be reported.

Fig. 1. X-ray diffraction pattern for Cr:Ca<sub>3</sub>(BO<sub>3</sub>)<sub>2</sub> single crystal.

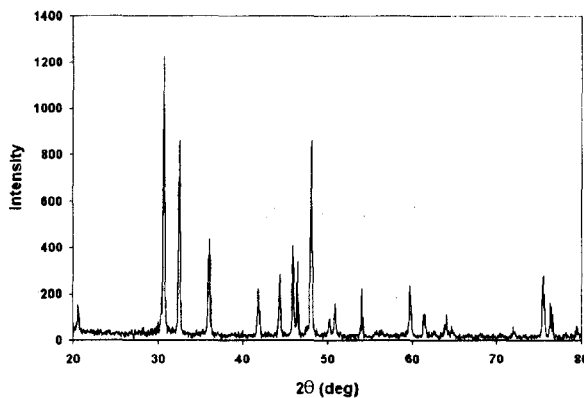


Table 1. X-ray diffraction data for Cr:Ca<sub>3</sub>(BO<sub>3</sub>)<sub>2</sub> single crystal.

2θ (deg)	Int	hkl
20.576	13.18	[-110]
30.667	100.00	[210]
32.513	78.32	[211]
36.030	39.56	[-211]
41.853	19.01	[-220]
44.347	22.70	[21-2]
45.905	30.84	[222]
46.412	20.06	[-310]
48.036	69.50	[31-1]
50.839	13.41	[321]
54.033	14.02	[30-2]
59.726	20.07	[411]
61.444	10.76	[40-1]
75.428	23.00	[432]
76.366	10.57	[22-4]