Study on the Growth of Large-size Sapphire Plate by EFG Method

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Sapphire(Al_2O_3) has stable physical and chemical properties, as well as excellent mechanical behavior due to its distinctive crystal structure, which is plays an irreplaceable role in optical elements, transparent armor, satellite space technology and so on. The Edge-defined Film-fed Growth method (EFG) is an advanced molding process, which overcomes the disadvantages of low material utilization, large amount of machine and high production costs in traditional artificial growth methods, and large-size sapphire crystal with low defects[1-2].

The growth of large-size single crystal has always been our research direction. The large-size sapphire single crystal plate was successfully grown in a self-designed EFG method, the ideal temperature distribution of the die surface was designed by thermal field simulation. Two-stage heating is used to control the crystal stress and bubble defects. The crystal could yield a plate with usable dimensions of up to 1000mm × 500mm × 12mm. Results of transmission measurements performed on 10 mm thick samples are presented and the transmission is similar to sapphire grown by other techniques.

References

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