

Scientists rapidly grow a long-seed DKDP crystal

March 6 2020, by Zhang Nannan



Large long-seed DKDP crystal with a long seed. Credit: SIOM

DKDP ($\text{KD}_x\text{H}_{2-x}\text{PO}_4$), which can minimize stimulated Raman scattering, is the best nonlinear crystal used as a tripler in inertial confinement fusion (ICF) facilities.

It takes one to two years to get a DKDP tripler for ICF facilities using a traditional growth method. Therefore, the rapid growth method comes into being. However, in the 'point-seed' rapidly grown DKDP crystals, all prismatic faces and pyramidal faces grow under high supersaturated solutions, forming the so-called pyramid-prism (PY-PR) boundary which is detrimental to efficient frequency tripling and phase matching.

Recently, the researchers from Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences (CAS), has successfully grown a large long-seed DKDP crystal with the size of 470 mm × 495 mm × 560 mm.

With a long seed of 320 mm high, the DKDP crystal has been growing for just over three months. And this crystal can cut out DKDP triplers that do not contain PY-PR boundary.

The long-seed DKDP crystal not only has the advantage of traditional method that does not contain PY-PR boundary, but also has the advantage of "point seed" rapid growth method that has a high growth rate. At the same time, it can also improve the cutting efficiency of triplers.

This is the first large long-seed DKDP crystal obtained in the world, indicating that the rapid growth of long-seed DKDP crystal has been successfully verified. And this is a new scheme of DKDP crystal growth

method provided for the construction of ICF facilities.

The long-seed DKDP crystal is grown from a self-developed device quipped with a Continuous Filtration System in SIOM. The related crystal growth method and the self-developed device have been patented.

Provided by Chinese Academy of Sciences

Citation: Scientists rapidly grow a long-seed DKDP crystal (2020, March 6) retrieved 3 May 2024 from <https://phys.org/news/2020-03-scientists-rapidly-long-seed-dkdp-crystal.html>

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