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*Editorial*

# Advances in Crystal Growth: Pioneering Materials for Tomorrow's Technologies

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Crystal growth is inherently multidisciplinary, encompassing fields such as thermodynamics and kinetics, fluid dynamics, solution and solid-state chemistry, process engineering, and defects engineering to name a few. This issue focuses on newly developed or innovative techniques for growing challenging compounds, including those exhibiting incongruent melting points and containing toxic or volatile elements, as well as nanostructures.

We enthusiastically accepted the invitation from the Crystals Editorial Office, recognizing it as an excellent opportunity to highlight the latest advancements in crystal growth techniques and showcase achievements from the crystal growth community. Our aim is to uncover trends in technical evolution, provide insights into key milestones, and offer valuable guidance to newcomers—an endeavor that reflects the original intention behind editing and publishing this issue.

With the above goals in mind, nine papers—including eight research articles and one review—were carefully selected and accepted for this Special Issue "Advances in Crystal Growth: Pioneering Materials for Tomorrow's Technologies", Crystals (ISSN 2073-4352). We are pleased to present outstanding works that showcase a variety of growth techniques, including the Czochralski method, the Bridgman method, the optical floating zone growth method, the vapor–solid growth technique, and an innovative method for fabricating low-density InAs/GaAs quantum dots.

The materials explored in these studies span a diverse range, including lithium niobate crystals co-doped with uranium and indium [1], oriented magnesium bicrystals [2], rare earth monosilicate compounds $R_2SiO_5$ (with R = Dy, Ho and Er) [3], ZnO micro- and nanostructures [4], aluminum nitride crystals [5], titanate perovskite $YTiO_3$ [6], and InAs/GaAs quantum dots [7].

We would like to highlight the notable work by Wolfram Miller et al. [8], which focuses on the Czochralski growth of high-purity Ge crystals. This experimental study is complemented by simulations of the evolution of dislocation density during the growth process using the open-source software MACPLAS. Their work exemplifies a logical and forward-thinking approach to achieving high-quality results, setting a clear direction for future research.

Additionally, we highly recommend the excellent review by Naoki Kikugawa [9], which provides an insightful overview of the historical development of the optical floating zone growth technique, culminating in its modern advancements using laser heating. This review is particularly valuable for young researchers seeking to familiarize themselves with the evolution and applications of this method.

These contributions collectively represent cutting-edge progress and recent achievements in crystal growth research. They not only reflect the current state of the field but also

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Received: 19 December 2024
Accepted: 24 December 2024
Published: 25 December 2024

**Citation:** Liu, Y.; Bi, D.W.; Magrez, A. Advances in Crystal Growth: Pioneering Materials for Tomorrow's Technologies. *Crystals* **2025**, *15*, 5. https://doi.org/10.3390/cryst15010005

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inspire further innovation. As Guest Editors, we are delighted by the exceptional quality of the contributions and are proud to share these remarkable works with our readers.

**Conflicts of Interest:** The authors declare no conflict of interest.

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