凝聚态物理-北京大学论坛

2023年第21期（No.573 since 2001）

时间：10月26日（星期四）15:00—16:30
地点：北京大学物理楼中212大教室

Recent progress and prospects on bulk AlN crystal growth by PVT method

吴 亮 教授

报告人简介（About speaker）：Dr. Liang Wu received his Ph.D., master and bachelor degree from Université catholique de Louvain, Tsinghua University and Dalian University of Technology, respectively. As a National Distinguished Expert, Dr. Liang Wu has more than 20 years of research and development experience on various crystal growth processes and material engineering for semiconductor, solar and LED applications, including crystal growth equipment & hotzone design, modeling & optimization, defect engineering and material characterization. His team developed world-first 60 mm crack-free bulk AlN single crystalline wafer with leading DUV transparency in 2019, and 3-inch bulk AlN crystals at the end of 2022. Prior to joining Shanghai University as a full professor, he held various R&D and management positions at Intel, FEMAGSoft SA (Belgium), and GCL Energy Holding Limited. He has been granted more than 60 patents and authored one book published in Germany. He contributed more than 100 journal/conference papers and invited/plenary keynote talks in leading national/international conferences.

摘要（Abstract）：Bulk aluminum nitride (AlN) offers excellent properties , such as wide bandgap (6.2 eV), high thermal conductivity [340 w/(m·°C)], high breakdown field strength (15.4 MV/cm), excellent UV transmittance, and chemical stability, and consequently shows compelling advantages over other competitors (SiC/GaN/Ga2O3) in power electronics as well as in deep-UV optoelectronics. In the past decades, considerable effort has been made to grow bulk AlN crystals by the physical vapor transport (PVT) method. Nevertheless, growing large high-quality AlN single crystals is still a very challenging task from the viewpoint of both technological and scientific aspects.

In this talk, an overview of the AlN application potential will be summarized. General strategies to grow AlN crystals by PVT method will be given and their advantages and disadvantages will be addressed in great detail. Finally crack-free and high-quality AlN single crystalline boules up to 76 mm (3 inches) in diameter by the homoepitaxial PVT method using a serials of proprietary techniques will be demonstrated. Material characterization results by high-resolution X-ray diffraction (HRXRD), Raman spectroscopy and preferential chemical etching after standard lapping/polishing will also be presented. At the end of this talk, primary Far-UVC LED (232 nm) and surface acoustic wave (SAW) devices based on C-plane and A-plane bulk AlN substrates will also be demonstrated, respectively.

邀请人：于彤军 tongjun@pku.edu.cn