

Special Issue Reprint

Processing Technology of Brittle Crystal Materials

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In this reprint, the mechanical properties and material removal behaviors of brittle crystals and ceramics are evaluated using the nanoindentation and scratch tests. Some advanced processing technologies oforf brittle crystals, ceramics, and composite materials are proposed, such as precision grinding, rotary ultrasonic milling and drilling, continuous polishing, thermal-controlled fracture cutting, laser processing, abrasive flow machining, and the additive manufacturing process. In addition, the relationship between the critical cutting depth and the maximum undeformed chip thickness on the removal mode of brittle materials is analyzed. The theoretical models of grinding force and surface generation are developed by considering the brittle-to-ductile transition, arc-shaped effect, and synchronous vibration of the wheel. These advanced theoretical models and processing methods effectively improve the surface integrity of the workpiece and machining efficiency, and reduced the cutting force and tool wear.



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