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Laser beam micromachining its challenges and opportunities
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Abstract
This chapter discusses about Laser beam micromachining (LBMM) which has emerged as an effective, flexible and precise beam based micromachining method for the fabrication of miniaturized and intricate features in various materials. LBMM utilizes heat through focused laser beams to remove material using processes such as ablation, melting, or vaporization, resulting in the creation of complex and highly accurate microstructures. The flexibility of LBMM allows for the fabrication of diverse geometries, including channels, holes, and surface patterns, in a wide range of materials, including metals, polymers, ceramics, and composites. Moreover, LBMM offers several advantages such as high accuracy, minimal heat-affected zones, and non-contact nature, making it suitable for applications in microelectronics, biomedical devices, aerospace components, and more. Recent advancements in LBMM include the integration of advanced laser sources, such as ultrashort pulse lasers, and the development of hybrid processes that combine LBMM with other micromachining techniques. These advancements have enabled improved precision, reduced thermal effects, and expanded material processing capabilities. However, challenges remain, including the optimization of process parameters, control of heat accumulation, and enhancement of machining efficiency. Overall, LBMM continues to evolve as a promising method for microfabrication, offering unique capabilities and holding great potential for future technological advancements.

Author Keywords
Channel; EDM; Electrodischarge micromachining; Hybrid; Laser; Laser beam micromachining; LBMM; Micro; Microhole; Micromachining

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