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EDITORIAL

Advancements and Futuristic Trends in Laser Material Processing

Lasers have emerged as indispensable tools in modern manufacturing, revolutionizing material processing and pushing the boundaries of industrial applications. Initially recognized for their precision in cutting and engraving, lasers have rapidly evolved into versatile instruments capable of performing a range of material processing tasks, including forming, joining, cladding, alloying, machining, and hardening. Their impact now extends far beyond material manipulation, playing a crucial role in measurement, sensing, and inspection, thereby enhancing quality control and process optimization.

Key applications such as laser cutting, welding, drilling, engraving, cleaning, additive manufacturing, surface treatment, and micromachining exemplify the transformative role of lasers in today's production techniques. The rapid advancements in laser processing and simulation technologies are continuously expanding the capabilities and scope of laser applications in manufacturing and materials science. These innovations are driving improvements in efficiency, precision, and versatility across a wide range of industries, from automotive and aerospace to electronics and medical devices.

As the demand for precision and adaptability grows, the field of laser processing has seen remarkable technological developments. These advancements are reshaping the industrial landscape, enabling new possibilities and enhancing existing applications. At the heart of these innovations are significant improvements in laser technology, process optimization, and simulation techniques, which are pushing the limits of what is possible in manufacturing and setting new standards for performance and efficiency.

This special issue is dedicated to exploring the latest developments and future directions in laser processing. We are delighted to present fourteen innovative papers that collectively enhance our understanding of laser-based materials processing and fabrication techniques. The research presented

spans diverse applications, from micromachining and additive manufacturing to surface modification, highlighting both experimental, computational and soft-computing advancements.

Together, these papers reflect the interdisciplinary nature of laser engineering research today. The authors have made substantial contributions to advancing knowledge on laser-material interactions, process optimization, and the development of new applications. We hope this special issue will serve as a catalyst for further innovation and foster greater collaboration within the global laser engineering community.

We extend our deepest appreciation to the authors, whose contributions have been essential in making this issue possible, and to the reviewers for their diligent efforts in ensuring the quality of these publications. We are confident that this collection of papers will serve as a valuable resource for researchers, practitioners, and policymakers, sparking new ideas and advancing the science and engineering of lasers in materials processing.

It is with great pleasure that we introduce this special issue and trust it will inspire further research and development, pushing the boundaries of laser technologies and their applications in engineering.

Dedication: It is with deep respect and gratitude that I dedicate this special issue of Lasers in Engineering to the memory of Professor Lawrence Jonathan, our former Editor-in-Chief, who recently passed away. Though we never had the opportunity to meet in person, our numerous email exchanges left a lasting impression on me. Professor Jonathan was instrumental in fostering my association with this journal, always welcoming my special issue proposals with enthusiasm and trust. His encouragement and support were invaluable, and this very special issue was approved by him, a testament to his belief in collaborative innovation. His wisdom and vision will continue to inspire me, and his loss is profoundly felt by all who had the privilege of working with him.

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