

## Preface

The unique properties of monochromaticity, coherence and directionality possessed by laser beams mean that they can be focused down to very small spots and travel for long distances without much deviation in these properties. These features make lasers suitable for scientific and industrial application, leading to a diverse and dynamic research base. Lasers are used extensively in industry for material processing, sensing, detection and analysis; evolving as non-contact, high precision, high accuracy and high repeatability tools suitable for all major manufacturing processes like forming, joining and welding, cutting, surface treatment, additive manufacturing (AM). Laser beams can be used to process almost all types of materials including metals, polymers, ceramics and composites.

Laser material processing is challenging and so it is a fertile research area due to the complex multi-interactions between laser parameters-thermal, mechanical and physical properties of workpiece materials-workpiece geometry-external constraints like cooling, surrounding temperature, clamping, etc. It is, therefore, very difficult to generalise the effect of process parameters during laser material processing. Still, the demand for lasers within the manufacturing sector grows because customised production at a minimum possible price is the need of modern manufacturing industries, along with the requirement to frequently change materials, designs and manufacturing processes to be sustainable and gain a competitive edge.

We are glad to present this special issue on laser material processing from selected papers presented at the 9th International Conference on Advancements and Futuristic Trends in Mechanical and Materials Engineering (AFT-MME 2021) held in association with the Society of Materials and Mechanical Engineers ([www.somme.in](http://www.somme.in)) from the 9-11 December 2021. The inaugural AFTMME conference took place in 2010 to bring together mechanical and materials engineers practicing as academicians, researchers, industrialists and start-up professionals under a common umbrella for sharing their ideas, experiences and disseminating knowledge. From the luminaries who congregated at AFTMME 2021 to present their work and discuss futuristic advance-

ments, a total of eight peer reviewed research and review articles were selected to form this special issue. Using experimental, numerical and analytical analysis these papers cover a range of topics in laser material processing, including laser cladding, laser beam machining, laser additive manufacturing (LAM), laser re-melting, laser transformation hardening and laser coating. We sincerely acknowledge the time and effort contributed by the authors and reviewers for ensuring this special issue came to fruition. Finally, we wish this special issue to be successful, and useful for working engineers, researchers and academicians.

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