Special Issue

High-Energy Pulsed Laser-Driven Synthesis and Modification of Nanomaterials

Message from the Guest Editors

High-energy pulsed lasers are advanced optical devices capable of generating extremely intense laser pulses with durations ranging from femtoseconds to nanoseconds. Today, they are indispensable in applications requiring precision, high peak power, and minimal thermal damage, such as laser machining, nuclear fusion research, and biomedical surgery.

The operational principle of high-energy pulsed lasers relies on the controlled release of stored energy in a gain medium. Key technologies include Q-switching, which produces nanosecond pulses by modulating the laser cavity's quality factor, and mode-locking, enabling femtosecond pulses via phase synchronization of longitudinal modes. Chirped pulse amplification (CPA), a Nobel Prize-winning technique, further boosts peak power by stretching, amplifying, and compressing pulses to avoid optical damage. These methods allow pulsed lasers to achieve terawatt or even petawatt peak powers, far exceeding continuous-wave lasers.

We invite authors to contribute original research articles and review articles highlighting recent breakthroughs and future perspectives in high-peak-power laser development and utilization.

Guest Editors

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Message from the Editor-in-Chief

Nanoscience and nanotechnology are exciting fields of research and development, with wide applications to electronic, optical, and magnetic devices, biology, medicine, energy, and defense. At the heart of these fields are the synthesis, characterization, modeling, and applications of new materials with lower nanometer-scale dimensions, which we call “nanomaterials”. These materials can exhibit unusual mesoscopic properties and include nanoparticles, coatings and thin films, metal–organic frameworks, membranes, nano-alloys, quantum dots, self-assemblies, 2D materials such as graphene, and nanotubes. Our journal, *Nanomaterials*, has the goal of publishing the highest quality papers on all aspects of nanomaterial science to an interdisciplinary scientific audience. All of our articles are published with rigorous refereeing and open access. We are proud of our increasing impact factor and ability to provide rapid decisions to authors.

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