



External field-assisted laser ablation in liquid: An efficient strategy for nanocrystal synthesis and nanostructure assembly

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ABSTRACT

Laser ablation in liquid (LAL) has received considerable attention over the last decade, and is gradually becoming an irreplaceable technique to synthesize nanocrystals and fabricate functional nanostructures because it can offer effective solutions to some challenges in the field of nanotechnology. The goal of this review is to offer a comprehensive summary of recent developments of LAL in nanocrystal synthesis and nanostructure fabrication. First, we will introduce the fundamental processes of microsecond, nanosecond, and femtosecond LAL, and how the active species act differently in plasma, cavitation bubbles, and droplets in the different LAL processes. Second, a variety of LAL-based techniques for nanomaterials synthesis and processing are presented, such as electric-, magnetic-, and temperature-field LAL, as well as electrochemically assisted LAL, pulsed laser deposition in liquid, and laser writing of nanopatterns in liquid. Third, new progress in LAL-generated nanomaterials is described. Fourth, we emphasize five applications of LAL-generated nanomaterials that have emerged recently in the fields of optics, magnetism, environment, energy, and biomedicine. Finally, we consider the core advantages of LAL, the limitations of LAL and corresponding solutions, and the future directions in this promising research area.

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