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Laser Synthesis of Nanomaterials

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Nanomaterials are a large area of research at present. These materials, which have at least one of their dimensions in the nanoscale (i.e., in a length range from 1 nm to 100 nm), have remarkable or unconventional properties, unlike bulk materials. These materials are currently used in many applications; however, new potential uses are being investigated. In this sense, there is large interest in their use in medicine, electronic devices, the production and storage of energy, composite materials, etc. The production of nanomaterials is addressed through physical and/or chemical methods; however, most of these methods exhibit low reproducibility or a low production rate or make use of toxic chemicals. In order to avoid most of these drawbacks, the laser-based synthesis of nanomaterials has emerged as an alternative to overcome these limitations. This family of methods use a laser beam to produce different nanomaterials (e.g., nanoparticles, nanowires or 2D materials) using diverse approaches. Techniques such as those based on laser ablation, laser vaporization, pulsed laser deposition (PLD), laser-chemical vapor deposition (LCVD), etc., are being explored at present to fabricate these nanoscale materials with a controlled size and shape. In this context, here we present research papers addressing the most recent developments in this field to summarize the current state of the art in the synthesis of nanomaterials using laser techniques.

