激光烧蚀：方便灵活的非线性纳米颗粒制备方法

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纳米科技被广泛应用于新材料和元器件的研发，帮助非线性光学领域取得了很多重要突破。

新加坡国立大学洪明辉院士团队总结了近期纳米颗粒涉及场强非线性效应的相关进展。在第三类的非线性效应中，非线性饱和吸收和光限幅效应被广泛研究。饱和吸收描述了物体透光率随着入射光强增大而增大的过程。拥有饱和吸收性质的材料被广泛应用于制造高能激光器中的相关原件，其中包括用于产生脉冲激光的 Q 开关。饱和吸收材料也可被用于智能光学原件和光学逻辑器件，有望在未来的光学计算机中发挥作用。另一方面，非线性光限幅效应陈述了一种完全相反的现象。因此，光限幅效应往往也被称为逆饱和吸收。逆饱和吸收也有着广泛的应用，包括各种高光强的保护器件、激光武器与光学调制器件。

如何增大材料的非线性效应，以便在较低光强下观测到显著的效果是这个领域的瓶颈问题之一。基于纳米颗粒设计的非线性系统在性能和多样性方面都展现出极大的优势，包括：1) 这些系统具有多功能性，可以根据具体的应用需求进行调整。2) 通过对于纳米颗粒系统的深度设计，可以拥有传统材料系统很难达到的性能。

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Laser ablation: a convenient and flexible fabrication approach for nonlinear optical nanoparticles

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Nanotechnologies have paved the ways to engineer new materials and break the conventional limits for nonlinear optics. And nanoparticles are widely used for nonlinear optical applications.

Laser ablation is a dynamic process to remove target materials from a solid substrate under high power short pulse laser irradiation. It can be conducted in air, liquid, and vacuum. Great flexibility and possibilities are offered for applications based on nonlinear optical nanoparticles to fulfill the requirements of different devices.

Nonlinear optical effects can be generally categorized into three groups, depending on the corresponding light properties: 1) nonlinear effect to modify the light wavelength, 2) nonlinear effect to change the light refraction; 3) nonlinear effect to vary the light amplitude/intensity. The research group of Prof. Hong Minghui from National University of Singapore reviews the latest progresses on the nonlinear optics of the third group, which is related to the light amplitude/intensity.

Recently, an increasing number of researches focus on optical devices with nonlinear optical nanoparticles to address the bottleneck challenges in this field. The research group summarizes the recent progresses in this direction, which focuses more on the meth-odologies with a series of case studies as the illumi-nation. It also covers extended topics to provide addi-tional views on their key advantages and achievements.

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