

## Contents

### Review

#### Nonlinear Frequency Conversion in Optical Nanoantennas and Metasurfaces: Materials Evolution and Fabrication

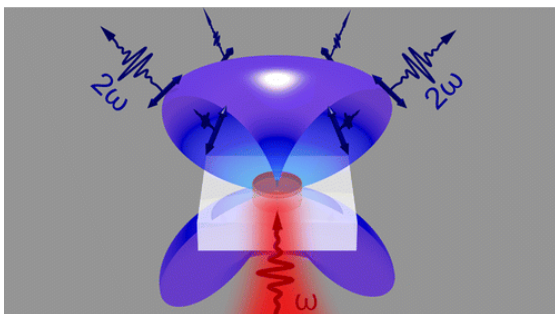
180021

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Nonlinear optics, whereby light is directly controlled by light, has a wide range of applications in our daily lives including novel light sources, sensing, and information processing. However, current nonlinear optical interactions are generally based on large crystals, which are not compatible with the size requirements of cutting-edge miniaturised systems. Therefore, shrinking the nonlinear structures down to the nanoscale, while keeping favourable conversion efficiencies, is of great importance for future photonics applications. In the last decade, researchers have studied the strategies for enhancing the nonlinear efficiencies at the nanoscale, e.g. by employing different nonlinear materials, resonant couplings and hybridization techniques. In this evolution, nanofabrication difficulties have been always the main obstacle to be addressed. Employing new materials with minimal optical losses and maximal nonlinear properties, as well as reasonable resistant against heat generated by high-power lasers, is always accompanied with requirements for developing new fabrication techniques. In this paper, the materials evolution and various approaches for fabricating nanostructured materials for nonlinear frequency conversion are reviewed. Detailed explanations of the advantages and disadvantages of each material, in terms of nonlinear properties and also nanofabrication techniques are provided, in this review.

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## Contents

### Original Article

#### Underwater image enhancement based on red channel weighted compensation and gamma correction model

180024

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Nowadays, more and more autonomous underwater vehicles (AUVs) and unmanned underwater vehicles (UUVs) are put into applications. The images collected by the equipments have important research value for the development of the ocean. Due to the special optical properties of the marine environment, the acquired video is prone to quality degradation such as color shift, edge blur and contrast reduction. Therefore, underwater image enhancement and restoration have received extensive attention and become a research hotspot. This paper proposes an underwater image enhancement algorithm based on red channel weighted compensation and gamma correction model. A red channel weighted compensation model is established by analyzing the scattering and attenuation characteristics of different wavelengths. Since the attenuation of green light is minimal, the green channel is used as a guided image to refine the edge information of red channel. Although the color of the compensated image is corrected, the image still retains low contrast. Then we use a method based on grayscale stretching to improve the visual effect of the image. Compared with some commonly used algorithm, it also shows certain advantages. The experimental results show that the restored images are natural in color and the contrast is improved by about 2 times. The algorithm can process video with 1280×810 resolutions at 30 frames per second after CUDA acceleration.

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