Special Issue

Nonlinear Optical Phenomena in Rare Earth Doped Crystals

Message from the Guest Editors

Rare-earth-doped micro-/nano-crystals and other atoms are widely used in quantum information, super-resolution imaging, and biofluorescent labeling due to their stable luminescence, rich wavelength, narrow linewidth, and long life. The interaction between coherent light and their atom-like structure provides a feasible method for generating quantum-like states of photons. Moreover, spontaneous four-wave mixing based on their atom-like composition presents the following advantages: narrow spectral linewidth, long coherence time, large phase mismatch range, multiple spatial modes, high signal brightness, and high signal-to-noise ratio. Therefore, these atoms have valuable applications in the fields of long-distance quasi-quasi-secure communication and quatern-like memory. Nevertheless, nonlinear optical phenomena in rare-earth-doped crystals face many challenges regarding novel applications.

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