

EXPLORING NONLINEAR OPTICAL MATERIALS: SYNTHESIS, ENHANCEMENT, AND COMPARATIVE ANALYSIS OF NONCENTROSYMMETRIC STRUCTURES

Bingheng Ji and Jian Wang

Department of Chemistry and Biochemistry, Wichita State University

Nonlinear optical (NLO) materials play a critical role in various technological applications owing to their unique optical properties. For practical applications, several basic conditions should be satisfied for the NLO materials, including suitable bandgap, large NLO coefficient, high LDT, and moderate birefringence, as well as good crystal growth habits. A critical aspect of synthesizing IR NLO materials lies in achieving a noncentrosymmetric crystal structure. A case study of two compounds with high structural similarity emphasizes the significance of noncentrosymmetric structures. The enhancement of second harmonic generation (SHG) in NLO materials through a case study of isostructural compounds with different transition metals will be discussed. Furthermore, in a comparative analysis of isostructural compounds, variations in these properties emerge. This investigation elucidates the intricate relationship between doped compounds based on parent NLO compound $\text{Ba}_6\text{Cu}_4\text{Sn}_4\text{S}_{16}$ and their physical properties, providing valuable insights into optimizing the performance of NLO materials.