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Synthesis and characterization of a noncentrosymmetric layered bismuth tellurium oxide nitrate

So Yon Lee and Kang Min Ok
Chung-Ang University, South Korea

Materials crystallizing in noncentrosymmetric (NCS) structures may show certain properties such as pyroelectricity, piezoelectricity, ferroelectricity and nonlinear properties. To achieve a macroscopic NCS structure, bismuth, tellurium and NO_3^- were used in the synthesis as constituents. Since the lone pairs on bismuth and tellurium are stereochemically active, they can exhibit asymmetric environment. The π -conjugated electron in the NO_3 group can also facilitate the nonlinear optical property. The hydrothermally synthesized material reveals a layered nonpolar structure with a weak hydrogen bond interaction. The compound crystallizes in the orthorhombic space group, $P-2_1-2_1-2_1$. Two types of existing telluriums, Te^{4+} and Te^{6+} show see-saw and octahedral coordination environment with oxide ligands, respectively. Bi^{3+} cations are linked to oxygen atoms and form BiO_9 and BiO_{10} polyhedra. NO_3^- is connected to the bismuth atoms. Powder second-harmonic generation (SHG) measurements indicate that the NCS material has a SHG efficiency of 20 times that of $\alpha\text{-SiO}_2$.

Biography

So Yon Lee has completed her Bachelor's degree at Chung-Ang University and is currently on her Master's degree at Chung-Ang University. She is advised by Prof. Kang Min Ok in the inorganic chemistry laboratory. So, she is working on the synthesis and characterization of new noncentrosymmetric materials.

soyon29@naver.com

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