

in formation of a twist block boundary.

Twist block boundaries in nanothin selenium crystals were studied by methods of transmission electron microscopy. Extinction bend contours along twist block boundaries were indexed using bright- and dark-field microdiffractions. Indexing of the bend contours was followed by examination of the alternation order of contours in crystal blocks along the boundaries. It was found that twist block boundaries of two types – with the invariable alternation order of bend contours and with a different alternation order of bend contours – were formed in nanothin selenium crystals (Fig. 1).

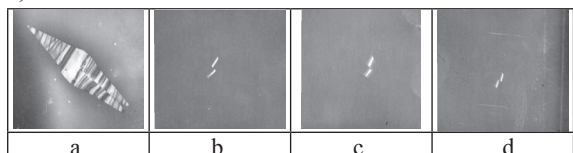


Fig. 1. An electron microscopic image of a nanothin selenium crystal with a block boundary, along which the alternation order of bend contours and, hence, the sign of the misorientation vector ω changes: bright-field image (a) and dark-field image in the reflection (201) (b), (202) (c) and (203) (d). $\times 5000$.

The analysis of the mutual alternation of bend contours along twist block boundaries in crystal blocks demonstrated that the mutual alternation order of contours changed due to the effect of the sign reversal by the misorientation vector ω . A model describing the formation of twist block boundaries in nanothin selenium crystals is proposed for explanation of the effect of the sign reversal by ω . This model takes into account that relaxation of a nonuniform elastic torsional distortion of the crystal lattice about [001] takes place in both blocks of a nanothin crystal.

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Keywords: selenium; crystals; boundaries

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Synthesize of Sillenite $\text{Bi}_{24}\text{AlO}_{39}$; As^{3+} Nanocrystal by Co-precipitation Method. Abdolali Alemi^a, Aliakbar Khandar^a, Samira Hajibabae^a. ^a*Department of Inorganic Chemistry, Tabriz University, Tabriz, Iran.*

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Sillenite single crystals have a nominal chemical formula $\text{Bi}_2\text{MO}_2\text{O}$, where (M=Ge, Si, Ti, Al, B...). [1] Sillenite compounds display a variety of advantageous physical properties that make them very important technological materials. The current applications of sillenites are mainly in the fields of electro optics, acoustics, and piezoelectrics, where their physical properties such as photo refractivity, optical activity, photoconductivity, piezo-modulus, the velocity of ultrasound wave propagation, etc., can be exploited. Recently, however, sillenites have begun to be considered for use as dielectrics in the field of electronics. [2] The overall structure of the $\text{Bi}_{12}\text{MO}_{20}$ crystal may be described in terms of the 7-oxygen Coordinated Bi

polyhedra and with MO_4 tetrahedral. This body centered cubic structure of sillenite crystals facilitate the solubility of novel metal ions in the crystal, because the tetrahedron of oxygen atoms surrounding the M atoms is able to expand or contract without a major effect on the remaining atomic arrangement. [3]. In this paper the sillenite crystal of $\text{Bi}_{24}\text{AlO}_{39}$ were doped with As^{3+} prepared by a co-precipitation method. In a typical process, Bismuth nitrate $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$ was initially dissolved in HNO_3 solution. Aluminum nitrate $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ was dissolved in a mixture solution of HNO_3 and anhydrous ethanol. And Arsenic oxide As_2O_3 was dissolved in HNO_3 solution. $\text{Bi}(\text{NO}_3)_3$ solution and $\text{Al}(\text{NO}_3)_3$ solution and As_2O_3 solution were mixed under stirring for 30 min. The pH value of the above solution was adjusted to ca 8.5-9.5. The resulting white precipitate was washed with twice distilled water for several times, and then dried, smashed and calcined at 600°C .

The prepared powders were examined by the XRD, FTIR and scanning electronic microscope (SEM).

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Hydrothermal Growth and Characterization of Boehmite ($\gamma\text{-AlOOH}$) Nanoparticles. Aliakbar Khandar^a, Abdolali Alemi^a, Zahra Hoseinpour^a. ^a*Department of Inorganic Chemistry, Tabriz University, Tabriz, Iran.*

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The synthesis of one-dimensional (1D) nanoscale inorganic nanoscale materials with special properties have long been attracting great attention in material science in the past few decades due to their distinctive geometries, novel physical and chemical properties and potential application in numerous areas[1]. Material properties are mainly determined by their composition, structure, crystallinity, size and morphology [2], [3]. Boehmite nanoparticles ($\gamma\text{-AlOOH}$) with the orthorhombic phase, Cmc space group and cell constants of about $a=3.7^\circ\text{A}$, $b=12.29^\circ\text{A}$, $c=2.84^\circ\text{A}$ have been successfully synthesized by a hydrothermal method at 180°C and 24h using Aluminum nitrate $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ as the aluminum source and sodium metaborate $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$ as the controlling agent. The size and morphology of boehmite nanoparticle could be controlled by adjusting the pH value of the reaction mixture. The size of boehmite can be varied in the range of 50 and 120nm. The resulting products were characterized by X-ray diffraction (XRD), fourier transform infrared spectra (FTIR), Scanning electron microscopy (SEM) and Uv-vis spectra.

The present nanoparticles with distinctive size and shape features might open up promising application in many fields.