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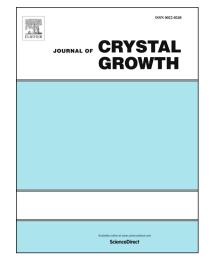
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Applying the X-ray diffraction analysis for estimating the height and width of nanorods in low symmetry crystal multiphase materials

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Abstract

In this work the potential of Rietveld refinement procedure is used to study the shape and size of non-spherical nanocrystallites. The main advantages of this approach are that not only it can successfully extend to all nanomaterials with different crystal symmetries but also it can evaluate the various phases of multiple materials comparing to electron microscopy methods. Therefore, between seven crystal systems, the formulation of monoclinic and hexagonal crystals is developed. This procedure is applied for the mixture of sodium carbonate and zinc oxide nanocrystallites at different fractions of doped gadolinium oxide. It is found that the crystallites of sodium carbonate and zinc oxide have the rod and ellipsoidal shapes, respectively. The microstructure results are compared with the results of scanning electron microscopy imaging. Good agreement is achieved between the results of scanning electron microscopy and Rietveld methods.

Keywords: Nanorods, Rietveld refinement, Multi-phase materials, SEM, Low symmetry crystals

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