

Growth and characterization of complex oxide single crystals

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In the manufacture of complex oxide single crystals usually methods of crystallization from melts are applied. It is especially useful for materials with incongruent melting points (i.e. decomposing during melting), having high vapour pressure upon melting or undergoing a phase transition under cooling. Commonly flux method, Top Seeded Solution Growth (TSSG) and Traveling Solvent Floating Zone (TSFZ) are used.

In the TSFZ method a molten zone is formed and held between two solid rods by its own surface tension. The advantage over the usual flux method is that crystal growth can be performed at one point on the temperature-composition phase diagram, and provides an opportunity to grow large single crystals even if their crystallization field is very narrow. There is no crucible necessary, which reduces the impurity level in the crystals.

In this work principle and practical aspects of the crystal growth experiments for many oxide materials (manganites, cobaltates, orthoferrites etc.) will be presented. Application of the methods which can be used for characterization of the composition, morphology, microstructure and orientation will be discussed.