Synthesis of large homogeneous single crystals for property measurements

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Synthesis of large homogeneous single crystals of minerals is important for understanding the properties of the Earth's interior in terms of composition, temperature and dynamics. The quality of large single crystals depends on the purity of the starting reagents and the stoichiometry of the initial mixture. High purity reagents of 99.99 % or more cause best results in crystal synthesis. In order to obtain best stoichiometry, we have tried various types (powders, pellets and chips) of reagents. For synthesis of large forsterite single crystals, we used high-purity granular MgO and SiO2 specimens of 1-3 mm size. Reagents of this grain size are easy to handle, and are suited for obtaining the best stoichiometry of a large amount (above 1 kg) of mixture. We have successfully produced extremely-large forsterite single crystals from the granular specimens. Further, we newly synthesized a large Cr-olivine single crystal in this study.

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