The introduction of an experimental apparatus used for growing large size of crystals from low temperature solution in space

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Abstract

To investigate the microgravity effect of low temperature solution crystal growth in space, an apparatus used for growing crystals from low temperature solution has been developed. In the apparatus the hydrophobic polytetrafluoroethylene membrane is used to seal a growth container by employing the water-repellent and ventilate characteristics of the membrane. When a solvent (water) leaves the growth container by evaporation, and then is absorbed by an adsorbent at the outer of the container, the crystal growth can be continuously carried out. The following factors for the manufacture of the apparatus should be considered: (1) selection of sealing materials for a crystallizer; (2) relation between evaporation capacity and pore diameter of hydrophobic polytetrafluoroethylene membrane; (3) relation between evaporation capacity and adsorbent weight; (4) selection of thermal insulation materials for a crystallizer. Utilizing this apparatus, a series of growth experiments on the ground have been performed and a number of α-$LiIO_3$ crystals with large size and good quality have been obtained. It has been confirmed that the tightness of the membrane to seal a crystallizer and the evaporation capacity of a solvent through it can meet the requirement of low temperature solution crystal growth. A good foundation has been built for crystal growth experiment in space in the future.

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