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Neutron diffraction of vacuum formed D₂O single crystals.

A number of techniques exist to form water ice single crystals such as following Czochralski , Bridgman or zone melting methods. These techniques require careful temperature control and thermal contact with some form of refrigerator. The single crystals grown for this study were produced using only the latent heat of vaporisation using standard vacuum equipment and no external refrigeration. The technique is a modification of the method presented by Khunatdinov and Petrenko [1]. The modified technique allowed the preparation of crystals 10mm in diameter and 50mm long in around 20 minutes. The technique is faster and requires less equipment than the traditional methods mentioned above. Also as the cooling occurs with no physical contact and only on the evaporating surface the possibility of multiple nucleation sites is reduced. The quality of the crystals was measured using neutron diffraction and it was found that the growth direction is inclined to the c-axis and discussions of the implications of this finding are presented.

[1] Khusnatdinov, N.N. and Petrenko V.F. , Fast-growth technique for ice single crystals, Journal of Crystal Growth, 163, (1996), 420-425pp

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