

Vitrification of Liquid Inclusions in hcp ^3He - ^4He Crystal: the Role of an Intermediate bcc Phase

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Phase structure of rapidly quenched solid helium samples is studied by the NMR technique in dilute ^3He - ^4He mixtures at 1.35 – 1.8 K. The pulse NMR method is used to measure the spin-lattice T_1 and spin-spin T_2 relaxation times for all coexisting phases. It is found that just before vitrification which was detected previously¹, liquid inclusions in hcp matrix exhibit additional spin-lattice relaxation process. The new process is attributed to equilibrium bcc phase because the relaxation rate coincides with that of bcc solid, as well as the temperature range, wherein said contribution was detected, coincides with the temperature area of an equilibrium bcc phase on phase diagram. After finishing the of liquid inclusions vitrification, the contribution from the bcc phase is not detected. The role of highly dispersed bcc phase structure in the transition of liquid inclusions to the disordered state is discussed.

1. A.P.Birchenko, N.P.Mikhin, E.Ya.Rudavskii, and Ye.O.Vekhov, JLTP 169, 208 (2012).

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