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Simultaneous Measurement of Torsional Oscillator and NMR of Dilute ^{3}He in Solid ^{4}He RYO TODA, Research Center for Low Temperature and Materials Sciences, Kyoto University, PATRYK GUMANN, Rutgers University, KEI KOSAKA, MASATOMO KANEMOTO, Graduate School of Science, Kyoto University, YUTAKA SASAKI, Research Center for Low Temperature and Materials Sciences, Kyoto University — We have carried out simultaneous measurements of on ^{3}He-concentrations in solid ^{4}He using state-of-the-art NMR technique and a torsional oscillator (TO) method. Our NMR results from a sample with a relatively high concentration ($\sim$ hundred ppm of ^{3}He), suggest existence of three different "states" of ^{3}He which depend on temperature. The first one is characterized by almost invisibly long spin-lattice relaxation T_1. This would imply that each ^{3}He atom behaves as gaseous in a solid ^{4}He-matrix. Another characterized by a reasonably long component in T_1 is a cluster of ^{3}He, which appears below the isotopic phase separation temperature. The third one is characterized by a relatively short spin-lattice relaxation time T_1, which also shows up below the isotropic phase separation temperature. This state may correspond to ^{3}He clusters in the disordered part of the crystal, since it does not disappear right away even above the phase separation temperature. As found by other studies, broadening out of the ΔQ^{-1}-peak as well as the NCRIf were found in TO. In addition we have also observed a TO response for 0.3 ppm sample. Further studies to clarify this issue are in progress.

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