

NMR Cross-Relaxation Study of Ultraslow Motion of the Domain Wall in Channel Inclusion Compound

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We report on an NMR study of ultraslow motions in the channel thiourea-hexachloroethane inclusion compound, $[2.95(\text{NH}_2)_2\text{CS}] \cdot \text{C}_2\text{Cl}_6$. Temperature dependent ^1H NMR relaxation measurements of the powder thiourea-hexachloroethane at different resonance frequencies, from 23 to 55.5 MHz, have been carried out. Significant reduction of the spin-lattice relaxation time at 38 and 47 MHz is caused by the cross-relaxation of protons via the quadrupole chlorine nuclei. We show that the effective ^1H - ^{35}Cl cross-relaxation observed in a powder sample is due to a slow mode process, when the molecules of the domain wall exhibit a correlated translational and rotational motion over the channel. Such propagation of the domain wall is confirmed by atom-atomic potential calculation. – Pacs: 76.60-k, 76.60.Es, 61.44.Fw, 61.66.Hq

Key words: NMR; Cross-Relaxation, Domain Wall; Ultraslow Motion; Inclusion Compounds.