

Abstract Submitted
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NMR study of Cu_2Se and $\text{Cu}_{1.98}\text{Ag}_{0.2}\text{Se}$ superionic conductors¹

ALI SIRUSI ARVIJ, JOSEPH H. ROSS, JR., Department of Physics and Astronomy, Texas A&M University, SEDAT BALLIKAYA², CTIRAD UHER, Department of Physics, University of Michigan — Cu_2Se and $\text{Cu}_{1.98}\text{Ag}_{0.2}\text{Se}$ are well known as superionic conductors and recently as thermoelectric materials due to observation of high ZT. We will report NMR of these compounds. Our results include indications of glassy anharmonic behavior at low temperatures, Cu ionic motion which becomes initiated near 90K, and motional narrowing near the phase transition at high temperatures as well as modified dynamics observed in the Ag-doped sample. NMR is particularly well suited to probe low frequency dynamics and at low temperatures the relaxation rate indicates anharmonic rattling behavior similar to what has been observed in other thermoelectric materials. A 90K change in the NMR spectra corresponds to the recently observed transport anomaly and indicates that the slow motion of Cu ions is initiated at this temperature and eventually becomes liquid-like at higher temperatures. We detect fast ionic motion in Cu_2Se starting at 140K whereas in the Ag-doped compound this onset shifts to a higher temperature around 300K. At high temperatures the spectra become motionally narrowed, and we will discuss the narrowing and shifts in terms of activated carrier density and ionic motion.

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