HYPERFINE INTERACTIONS IN $SrFe_2As_2$

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In 2008, one of the most significant events in the field of superconductivity was the discovery of a new class of high-temperature superconductors (SC) based on iron arsenide layered structures, with maximum critical temperature $T_C \approx 56K$. Three related Fe-As SC types of compounds have been known by now. We report on hyperfine interactions in $SrFe_2As_2$, a member of the group consisting of 122 phases, i.e. three-component AFe_2As_2 arsenides where A = Ca, Sr, Ba or Eu. Similarly to the cuprates, the parent compounds tend to be antiferromagnetic and superconductivity emerges under chemical doping (K, Na, Co, Ni) or in some cases at high pressure once antiferromagnetism is suppressed. $SrFe_2As_2$ crystallizes in the tetragonal structure at room temperature and exhibits structural transitions at 203K to orthorhombic lattice symmetry in agreement with the group-subgroup relationship between *I*4/*mmm* and *Fmmm*. ^{57}Fe Mössbauer spectroscopy (MS) experiments in standard transmission geometry reveal hyperfine field splitting below the structural phase transition temperature. Temperature dependence of the MS spectra of the samples with thickness $\approx 80\mu m$ was measured. At room temperature a singlet or narrow doublet with isomer shift *IS*=0,41mm/s was observed corresponding to the crystal structure. At low temperatures a sextet ($B_{hf} \approx 11.9$ T) was present confirming the magnetic order of the iron magnetic moments probably of the antiferromagnetic type. After grinding the samples and exposing them to air and moisture a doublet was found in all the spectra. We believe that this is due to defects or impurities produced by processing.

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