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Spin Dynamics in Recombinant H-chain Ferritin Reconstituted with 500Fe/Protein[1] GEORGIA PAPAEFTHYMIOU, Villanova University — Ferrihydrite mineral cores averaging 500 Fe/protein shell were grown within recombinant human H-chain ferritin and characterized by Mϕssbauer spectroscopy. At 4.2 K, two magnetic phases ascribed to iron at surface and interior sites of the antiferromagnetic nanolattice of the mineral core were identified, registering hyperfine fields of 445 kOe and 486 kOe, respectively. With increasing temperature, from 4.2 K to 20 K, their values decrease at widely different rates; at a rate of 3.52 kOe/K for interior and 19.33 kOe/K for surface sites, before spectral lines collapse to quadrupolar doublets at a blocking temperature of $TB = 22$ K. Below TB, spin relaxation at interior sites is consistent with the theory of collective magnetic excitations of a superparamagnetic particle, whereas spin dynamics at surface sites are more consistent with theories of many-spin nano-magnet systems with greater complexity in the potential energy landscape that supports low energy spin-wave excitations. The entire Mϕssbauer temperature spectral profile will be presented and discussed in the light of the above observations.

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