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Iron biomineral core structure of in vitro reconstituted human ferritins overexpressed in E-coli: A Mössbauer investigation. STEVE KIM, Department of Physics, Villanova University, FADI BOU-ABDALLAH, Department of Chemistry, State University of New York at Potsdam, PAOLO AROSIO, Department of Chemistry, Faculty of Medicine, University of Brescia, ARTHUR VIESCAS, GEORGIA PAPAEFTHYMIOU, Department of Physics, Villanova University —
Ferritin is a protein responsible for the storage of iron in living organisms. Ferritin is composed of a protein shell and an iron biomineral core consisting of ferrihydrite. Mössbauer spectroscopy can be used to find the oxidation state and coordination symmetry of the iron ions and overall electronic and magnetic properties of the core. Using this spectroscopic technique we have tested the core-shell model of ferritin on engineered proteins overexpress in *E. coli*, containing various ratios of heavy (H) and light (L) chains. The core-shell model states that the biomineral core is composed of a magnetically ordered inner core and an outer magnetically disordered shell. Due to its nanometric size (d˜7 nm) the ferritin core is superparamagnetic at room temperature, which means that the magnetic moments of the iron ions are constantly flipping in direction. Our study probes the structure and superparamagnetic properties of the core and their dependence on the nature of the protein shell. Preliminary results seem to validate the core-shell model of the ferritin core and shed some light on its dependence on the H/L chain ratios, *i.e.*, the number of ferroxidase centers on the protein.

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