

## Phase Transition in Iron Storage Protein Ferritin

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**Abstract :** Ferritin is a protein which present in the blood of mammals. It maintains the need of iron inside the body. It has an antiferromagnetic iron core, 7-8 nm in size, which is encapsulated inside a protein cage. The thickness of this protein shell is about 2-3 nm. This protein shell reduces the interaction among particles and make ferritin a model superparamagnet. The major composition of ferritin core is mineral ferrihydrite. The molecular formula of ferritin core is  $(\text{FeOOH})_8[\text{FeO}(\text{PO}_3\text{H}_2)]$ . In this study, we discuss the phase transition of ferritin. We characterized ferritin using x-ray diffractometer, transmission electron micrograph, thermogravimetric analyzer and vibrating sample magnetometer. It is found that ferritin core is amorphous in nature with average particle size of 8 nm. The thermogravimetric and differential thermogravimetric analysis curves shows mass loss at different temperatures. We heated ferritin at these temperatures. It is found that ferritin core starts decomposing after 390<sup>o</sup> C. At 1020<sup>o</sup> C, the ferritin core is finally converted to alpha phase of iron oxide. Magnetization behavior of final sample clearly shows the iron oxyhydroxide core is completely converted to alpha iron oxide.

**Keywords :** Antiferromagnetic, Ferritin, Phase, Superparamagnetic

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