Supporting Information

Experimental

Precipitation of Iron Oxide

Stock reagents were prepared as follows; $FeSO_4$ 2mMol/ml, $FeCl_3$ 1.3mMol, and NaOH 266mMol/ml, BSA stock was varied from 0-1mMol/ml. The Fe^{3+}:Fe^{2+} ratio was thus 2:3. Except in the case of BSA, magnetic stirring at 750rpm for 5 min was sufficient for full dissolution, 30 min stirring under gentle heating was required for the most concetrated BSA stock. BSA, $FeSO_4$ and then $FeCl_3$ were added to a reaction vessel before dropwise addition of NaOH over 1 min to induce precipitation. The resulting solution was then sealed by a finger tight cap in a glass sample container (both 8 and 24ml sample volumes) and allowed to age under ambient laboratory conditions.

Initial investigations of the affect of BSA inclusion in iron salt coprecipitation demonstrated a visually evident interaction between $FeCl_3$ and the protein solution during sample preparation. Upon addition of $FeCl_3$ the solution (for BSA 0.2-1.0mMol/ml) became cloudy and rust coloured, and gelatinous white globular material precipitated immediately but dissolved within 5 min of formation. This interaction is attributed to Fe^{3+} binding by BSA, however we note that in supplementary investigations increasing the iron salt concentration by orders of magnitude shows that $FeSO_4$ alone is sufficient to induce globularisation. It has been satisfactorily confirmed that the protein globularisation is not due solely to pH change, however iron adsorption may induce a conformational change in the protein that favours globularisation in low pH solution. The dropwise addition of NaOH was made immediately after $FeCl_3$ addition and thus before the dissolution of the globular material.

Sample Characterisation

TEM images were obtained by a Jeol 1200EX instrument operated at 80keV, additional imagery and energy dispersive x-ray spectroscopy was achieved by a Phillips TECNAI F20 operated at 200keV. For all images 20l of solution was deposited by pipette on to a carbon film copper grid (Agar). Magnetic properties were measured at room temperature by (VSM) (Lakeshore, 7400). FITR was obtained by a Thermo Electron Corporation Nicolet380 FTIR with a Smart Orbit Diamond 30,000-200cm-1 accessory.