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Chemical Synthesis and Characterization of Self-Assembled Nanoparticles Prepared in the Presence of Citrate Ions KARL UNRUH, THOMAS EKIERT, University of Delaware — Iron(II) ions in aqueous solutions containing various concentrations of citrate ions have been reduced to metallic Fe using sodium borohydrate. In comparison to the 10-20 nm diameter Fe particles formed in the absence of citrate, the presence of citrate results in the formation of 100–200 nm spherical (or in some cases cubical) particles self-assembled from much smaller Fe nanoparticles. Structural, chemical, and magnetic measurements indicate that for appropriate citrate/Fe ratios, air stable powders that exhibit a room temperature saturation magnetization of nearly 200 emu/g and a coercivity less than 100 Oe – even without deoxygenating the reaction solution or an explicit surface passivation step – can be obtained. Thermal treatments at temperatures between 350 and 450 $^{\circ}$C result in the sintering of the Fe nanoparticles within the larger aggregates while heat treatments at higher temperatures result in the sintering of the aggregates themselves into a continuous porous matrix.

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