**Supporting Information for;**

Gram Scale Synthesis of Fe/Fe*x*O*y* Core-Shell Nanoparticles and their Incorporation into Matrix-Free Superparamagnetic Nanocomposites

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C:\Users\jdwatt\Documents\Papers\2018\Matrix Free Nancomposite\Fig. S1 - Gaussian Distributions\Fig S1 - Gaussian Distributions.tifFig S1. Gaussian size distributions taken from small angle X-ray scattering (SAXS) measurements for the (a) 1g synthesis, and the (b) 10 g synthesis.

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Fig S2. (a) High resolution transmission electron microscopy (HRTEM) of a Fe/Fe*x*O*y* core-shell nanoparticle. (b) High magnification image of the iron oxide shell. The lattice spacing can be indexed to the (311) and (220) planes characteristic of either magnetite (Fe3O4) or maghemite (γ-Fe2O3). TEM alone is not capable of distinguishing between these two phases.

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Fig S3. TEM image of product resulting from the synthesis of 10 g of Fe/Fe*x*O*y* nanoparticles, using the reversible agglomeration mechanism.

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FIG. S4. Fluorescence experiments performed to confirm that the alkyl-diamine is covalently bound to the Fe/Fe*x*O*y* nanoparticle surface. This was carried out by reacting fluorescamine with the amine expressed nanoparticles to form a pyrrolinone species. The excitation wavelength was 390 nm, with the emission peak observed at 468 nm characteristic of the as-formed fluorescent pyrrolinones.