Supporting Information

Zn^{2+} Ion Surface Enrichment in Doped Iron Oxide Nanoparticles Leads to Charge Carrier Density Enhancement

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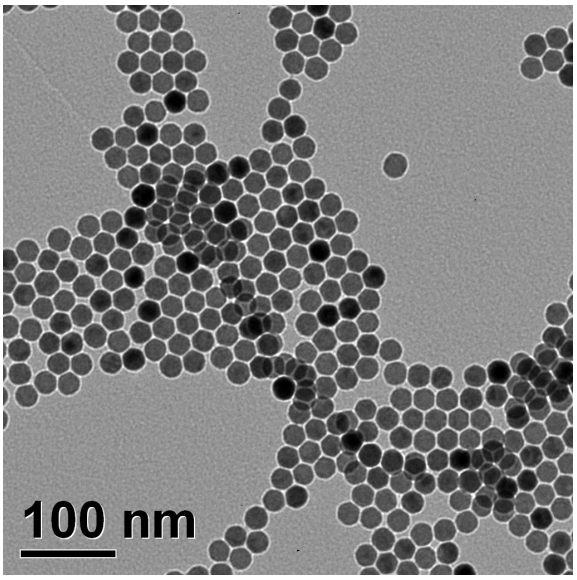

Figure S1. TEM image of the IONPs analogous to $Zn_{0.19}Fe_{2.81}O_4$ but prepared in docosane.

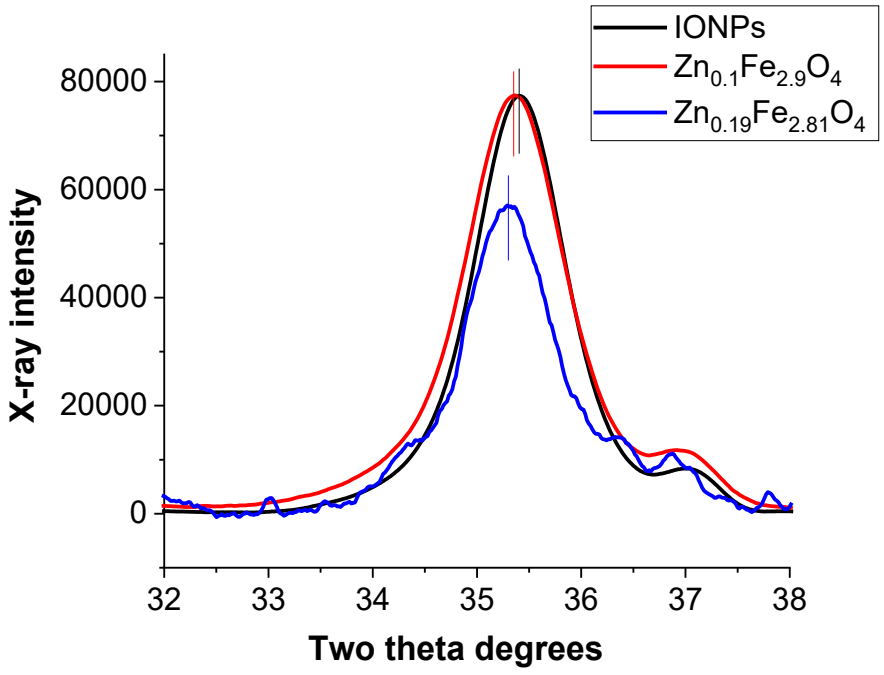

Figure S2. XRD patterns of the samples in the area of the (311) spinel peak.

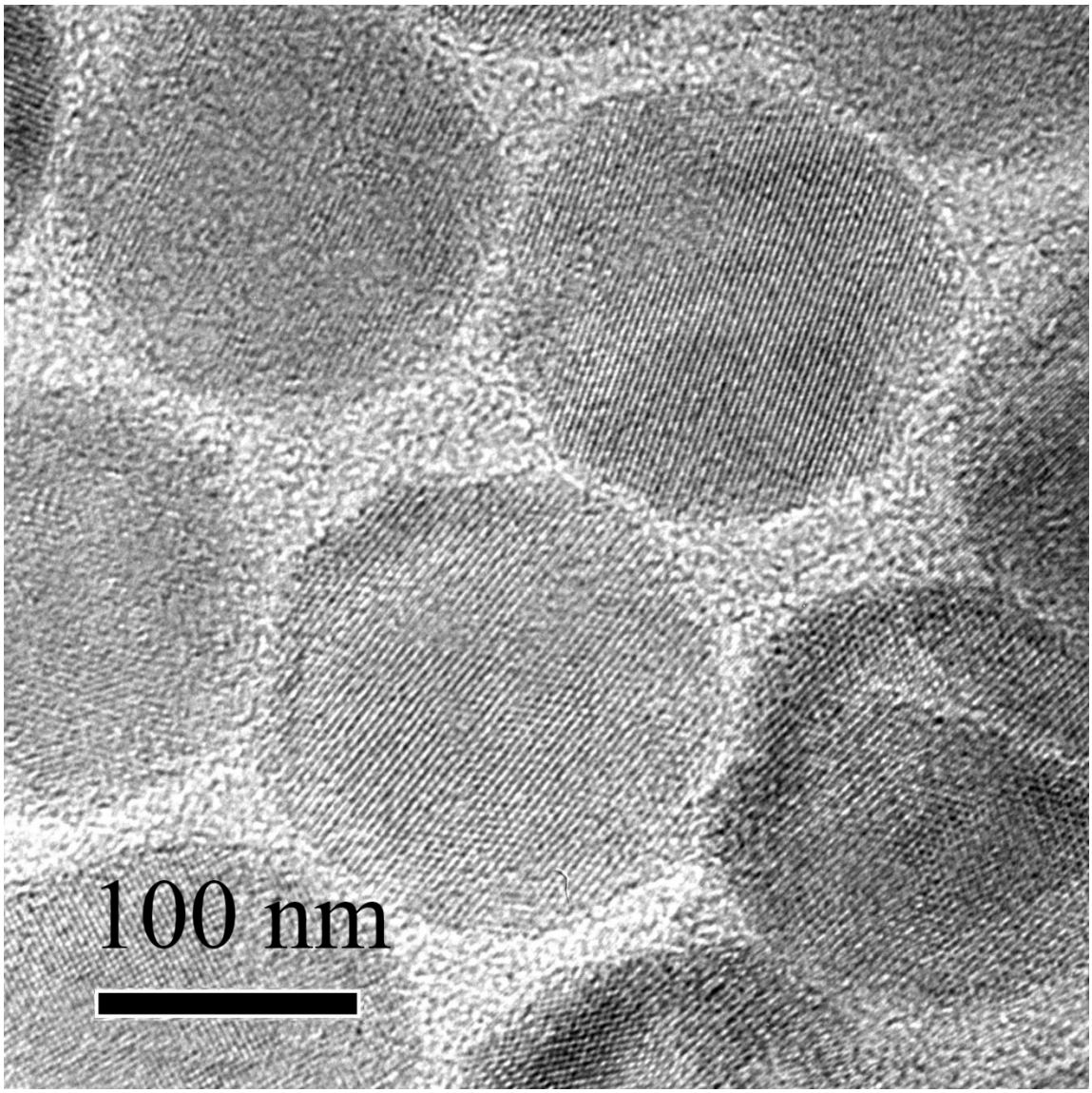

Figure S3. HRTEM image of $Zn_{0.35}Fe_{2.65}O_4$.

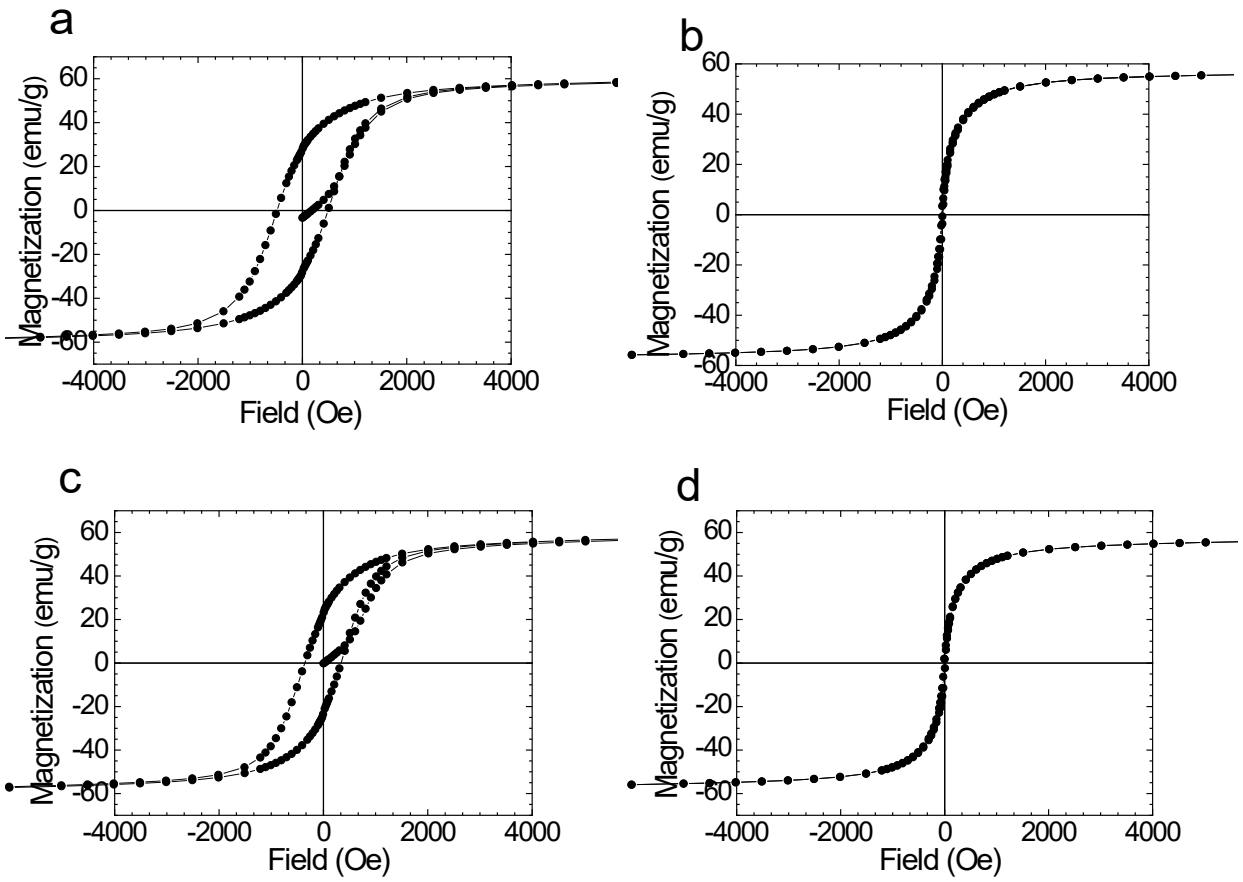

Figure S4. Isothermal magnetization curves of IONPs (a, b) and $Zn_{0.05}Fe_{2.95}O_4$ (c, d) at 5K (a, c) and 300K (b, d).

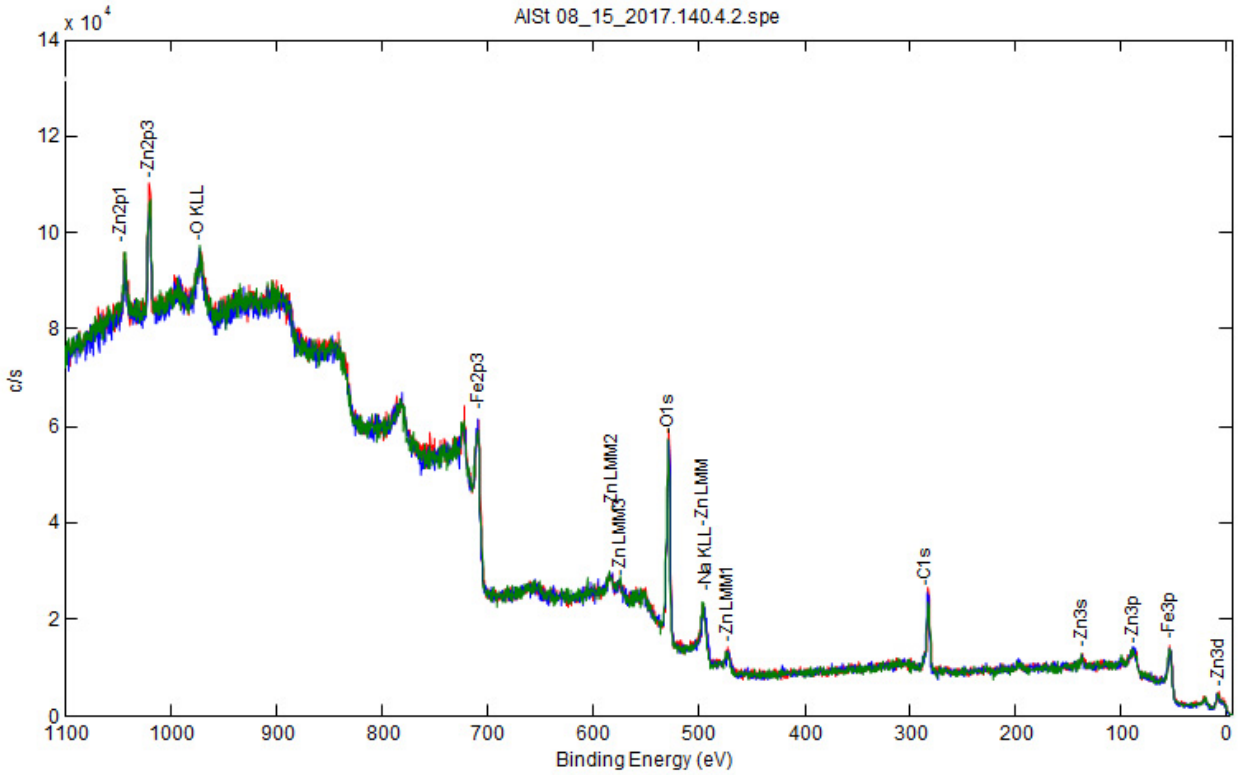

Figure S5. Survey XPS spectrum of $Zn_{0.35}Fe_{2.65}O_4$. Different colors represent three different spots probed.

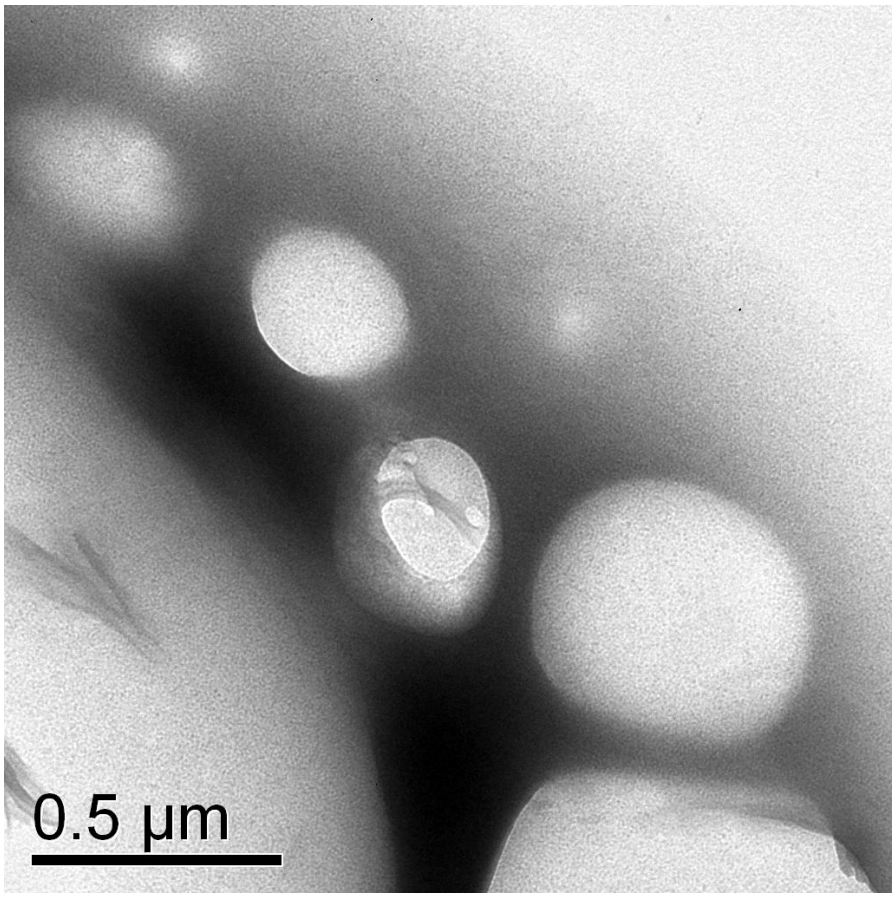

Figure S6. TEM image of the product of the Zn oleate decomposition under the reaction conditions that formed Zn-doped IONPs.

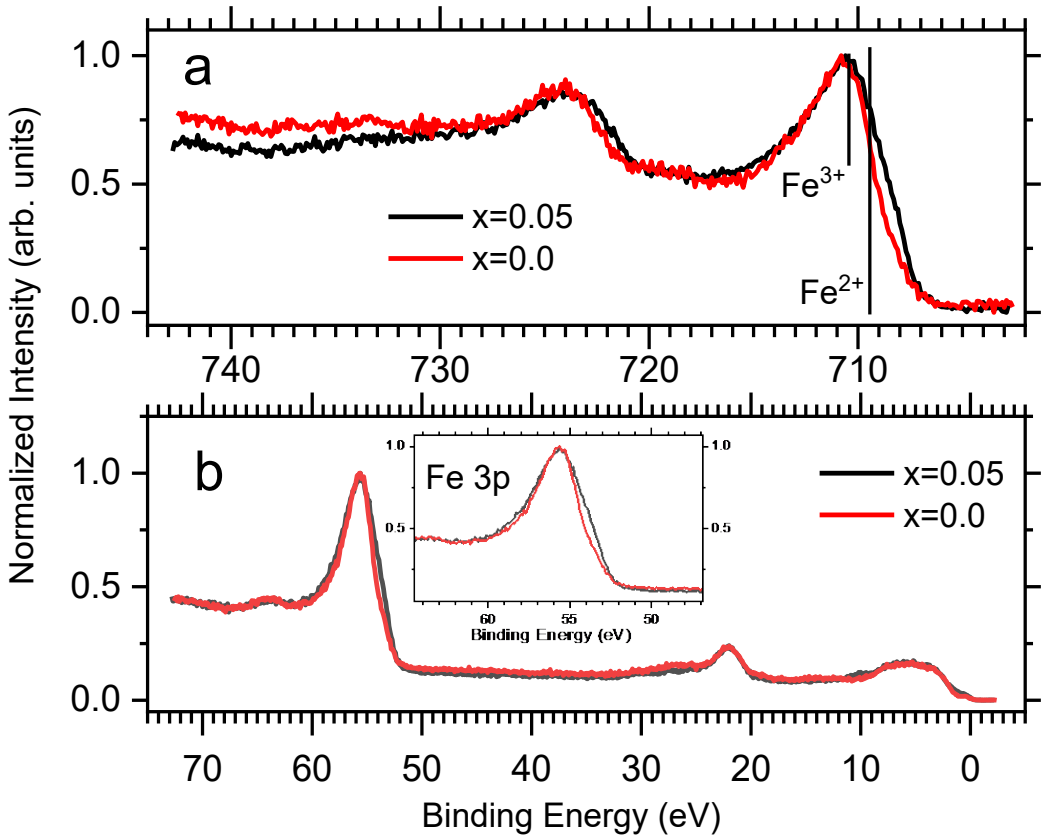

Figure S7. XPS Fe 2p spectra (a) and VB and Fe 3p (b) of $Zn_xFe_{3-x}O_4$ NPs at x=0.0 and x=0.05. The spectra are normalized to the Fe^{3+} signal. A similar increase of the Fe^{2+}/Fe^{3+} ratio was observed in the XPS Fe 3p spectrum (inset), indicating a replacement of Fe^{3+} ions with Zn^{2+}.

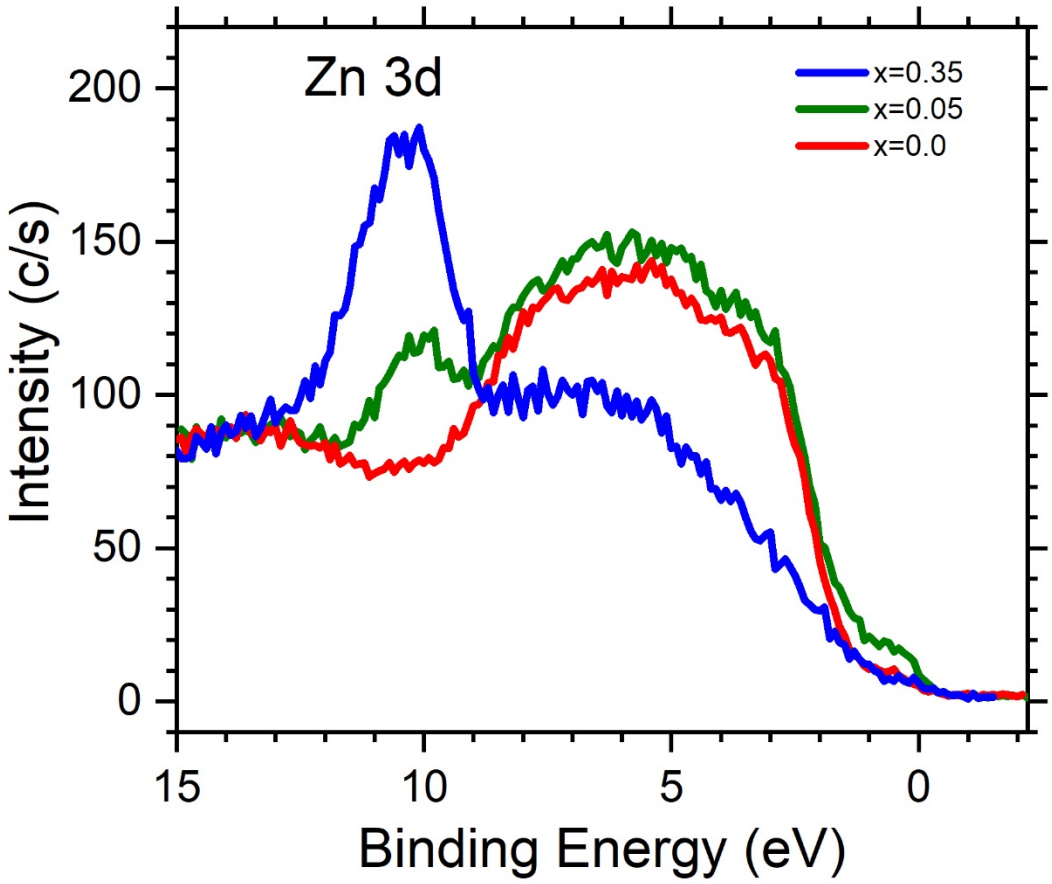

Figure S8. Valence band XPS spectra of $Zn_xFe_{3-x}O_4$ NPs at x=0.0, 0.05, 0.35 at $h\nu$ = 1486.6 eV.

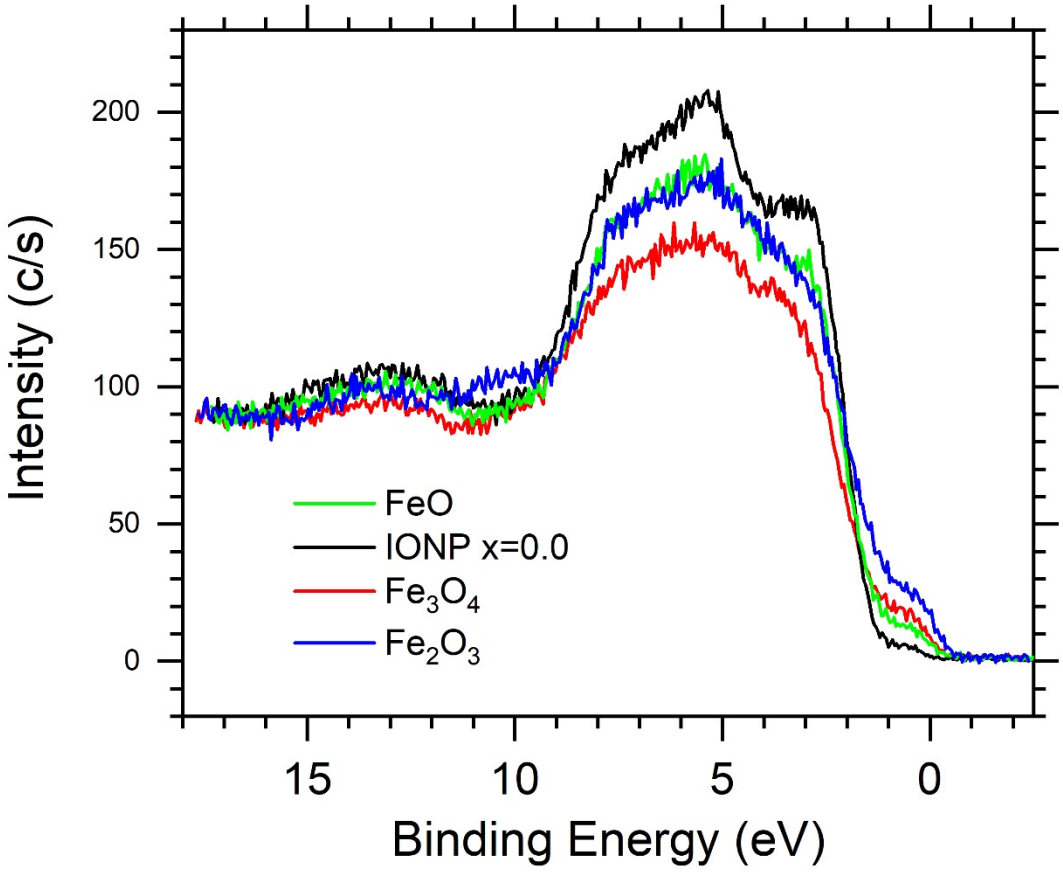

Figure S9. Valence band XPS spectra of FeO, Fe_3O_4 and Fe_2O_3 (standards) for comparison with undoped IONPs.

In order to evaluate upper and lower limits for expected DOS values near the Fermi level, we have performed measurements of several commercially available materials as standards which show that studied IONP samples exhibit DOS at the vicinity of the Fermi level within the range measured for standards with the highest DOS for FeO and the lowest one for Fe_2O_3.