

New Sustainable, Scalable and One-Step Synthesis of Iron Oxide Nanoparticles by Ion Exchange Process

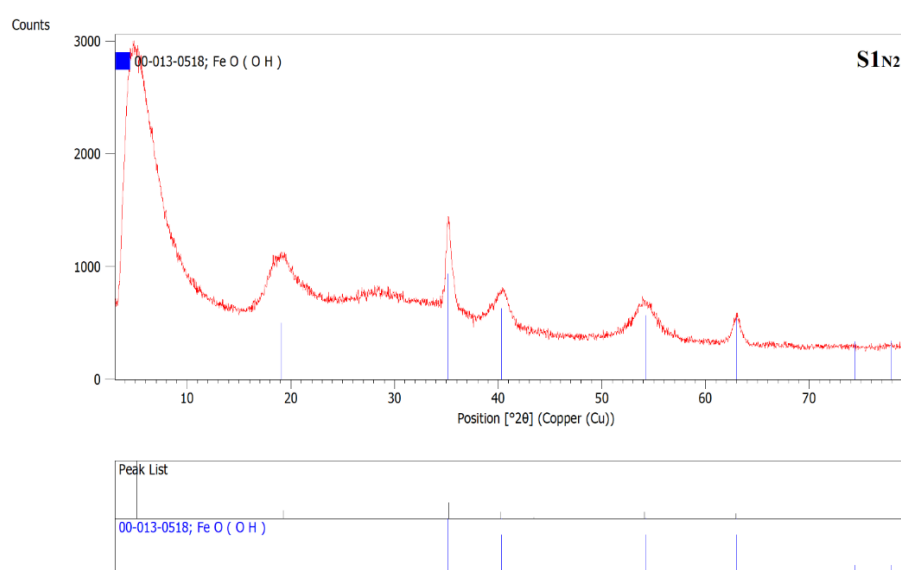
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Table S1. Crystallographic parameters and average crystallite size $\langle D \rangle$ related to the crystalline iron phases of the one-step syntheses, as evaluated by Rietveld refinements. Only the results related to S2_{N2} and S2_{air} samples are not reported due to their amorphous behaviour.

Sample	Phase	Crystal System	a (Å)	b (Å)	c (Å)	Cell Volume (Å ³)	$\langle D \rangle$ (nm)
S1 _{N2}	δ-FeOOH	hexagonal	2.95747	2.95747	4.55283	34.48675	5
S1 _{air}	Fe ₃ O ₄	cubic	8.38025	8.38025	8.38025	588.5333	29
S3 _{air}	Fe ₃ O ₄	cubic	8.38158	8.38158	8.38158	588.8129	8

Table S2. Crystallographic parameters and average crystallite size $\langle D \rangle$ related to the calcined iron phases, resulting by Rietveld refinement.

Sample	Phase	Crystal System	a (Å)	b (Å)	c (Å)	Cell Volume (Å ³)	$\langle D \rangle$ (nm)
S1 _{N2_200}	α-Fe ₂ O ₃	hexagonal	5.04865	5.04865	13.88428	306.4819	3
	γ-Fe ₂ O ₃	cubic	8.346	8.346	8.346	581.3465	16
S1 _{air_200}	γ-Fe ₂ O ₃	cubic	8.33975	8.33975	8.33975	580.0414	22
S1 _{air_600}	α-Fe ₂ O ₃	hexagonal	5.03431	5.03431	13.74726	301.7362	64
S2 _{air_500}	α-Fe ₂ O ₃	hexagonal	5.03424	5.03424	13.7532	301.8578	20
S3 _{air_200}	γ-Fe ₂ O ₃	cubic	8.34463	8.34463	8.34463	581.0602	6
S3 _{air_600}	α-Fe ₂ O ₃	hexagonal	5.03579	5.03579	13.75243	302.0264	42



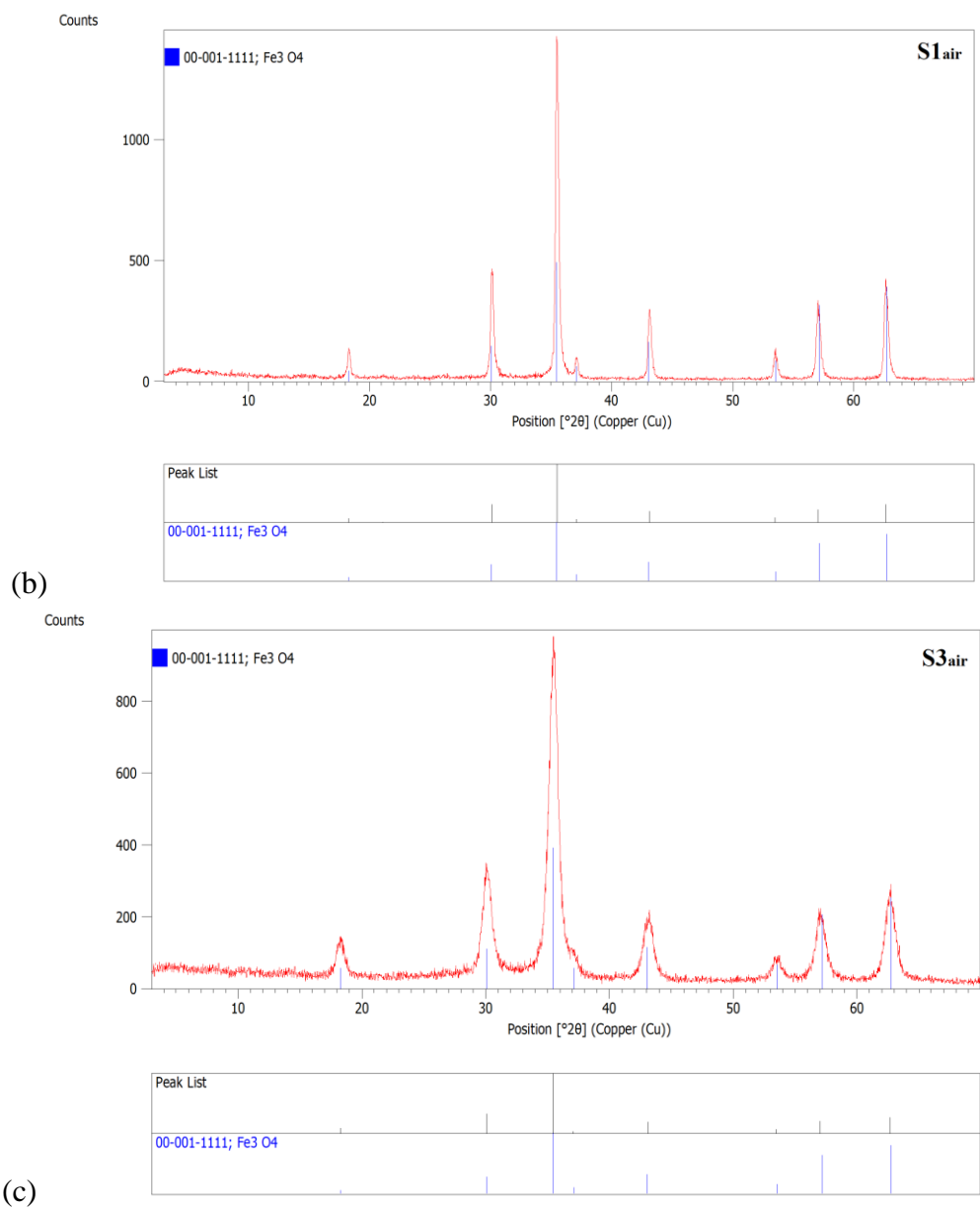


Figure S1. Comparison between the XRD results and the ICDD reference patterns. (a) S1_{N2} sample, (b) S1_{air} sample, (c) S3_{air} sample.

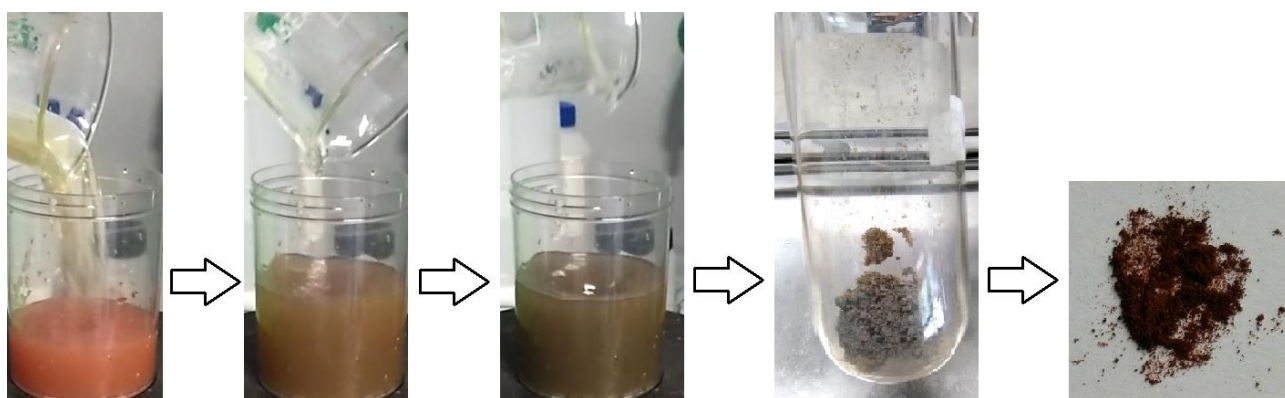
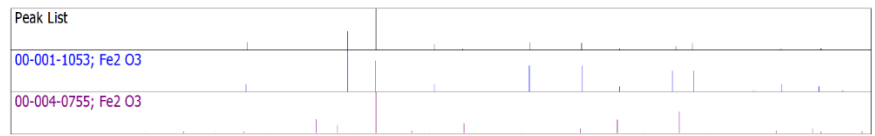
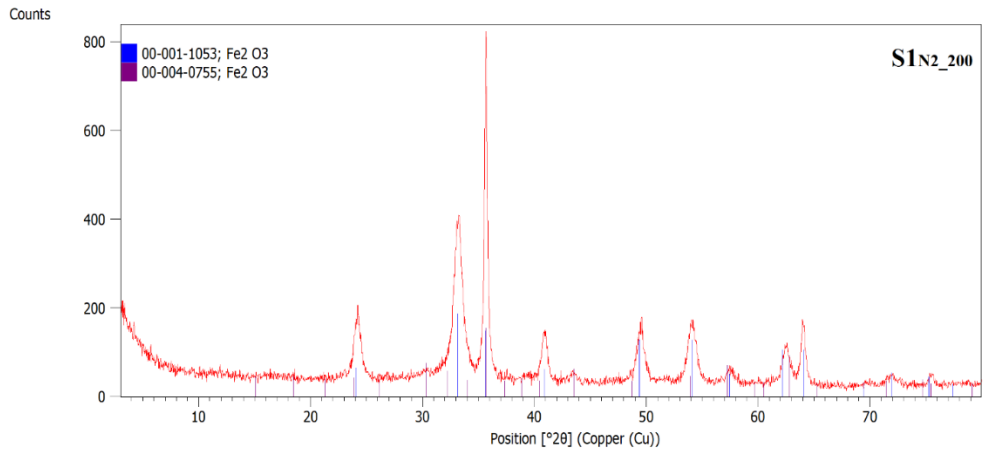
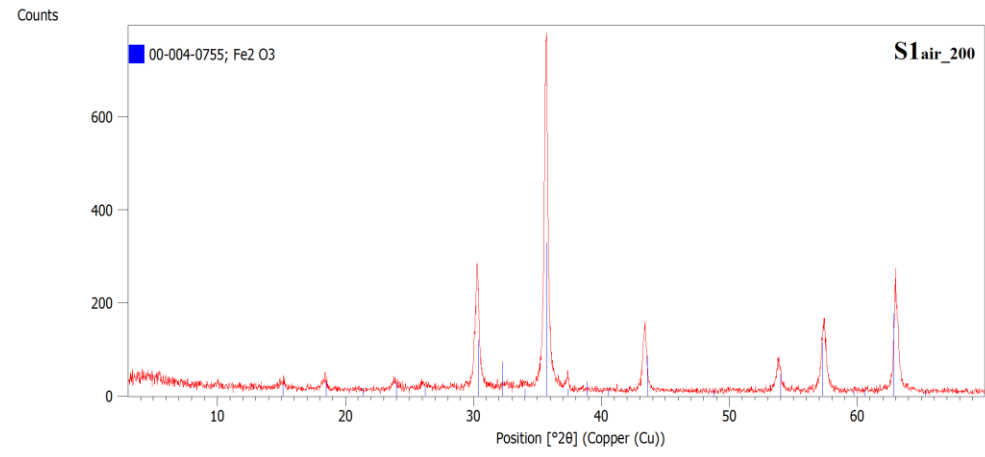


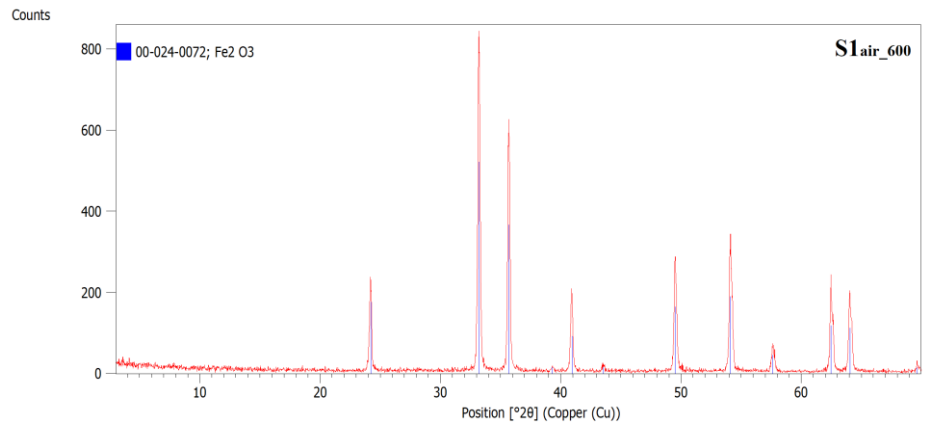
Figure S2. Photographic illustration on the synthetic route for the production of δ -FeOOH in powder form.



(a)



(b)



(c)

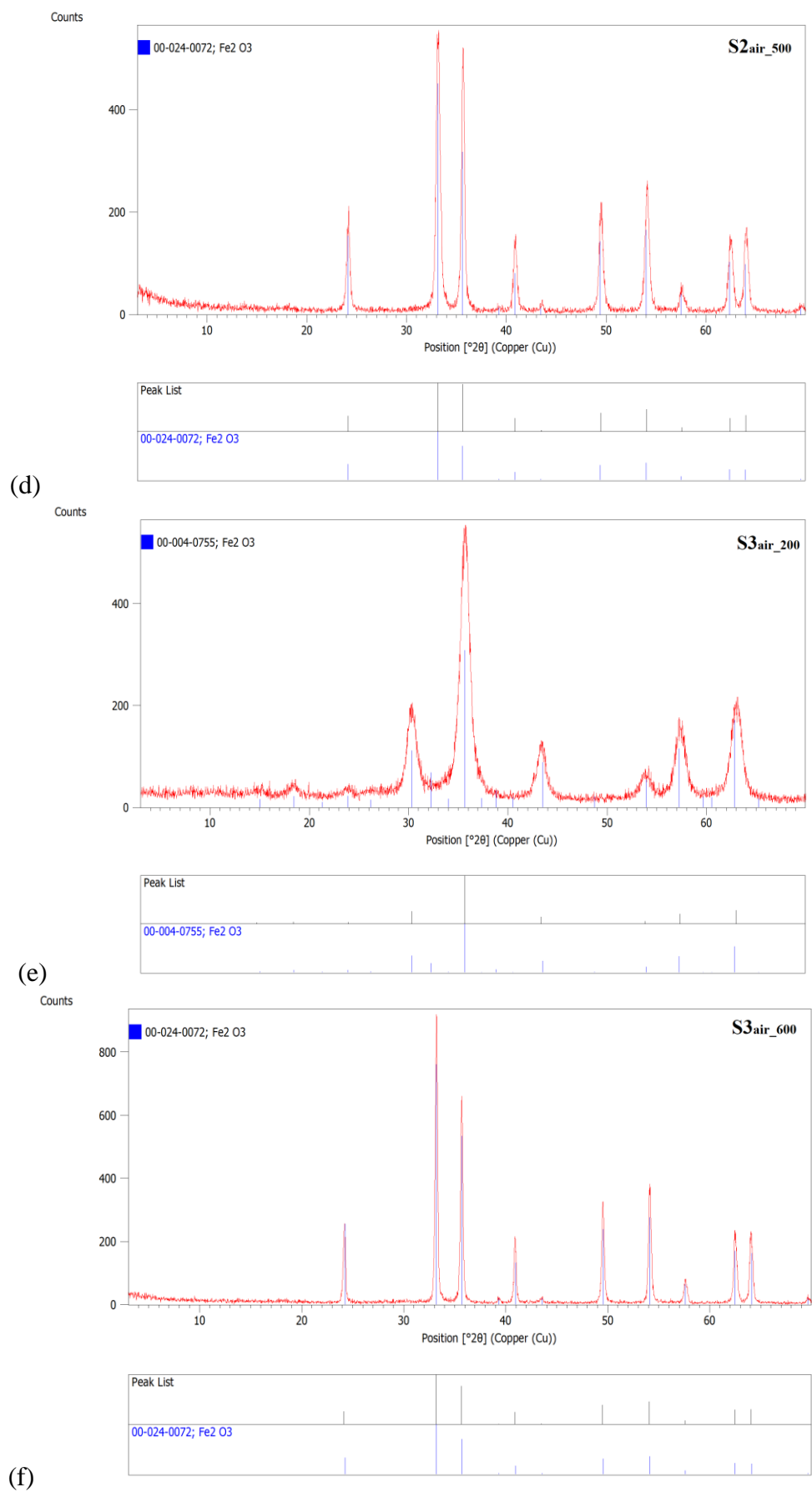


Figure S3. Comparison between the XRD results and the ICDD reference patterns. (a) S1_{N₂_200} sample, (b) S1_{air_200} sample, (c) S1_{air_600} sample, (d) S2_{air_500} sample, (e) S3_{air_200} sample, (f) S3_{air_600} sample.