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Liquid Phase Deposition of Iron Phosphate Thin Films

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SUPPORTING INFORMATION

Table 1. The effects of experimental conditions on the time intervals of the color change of the treatment solution from yellow to a colorless/pale yellow, the time it takes the treatment solution turns turbid and whether iron phosphate films were formed (🏳) or not formed (X) on the glass substrates

Temperature (°C)	Concentration (dM)	Color change time (h)	Cloudy (h)	Film Formation
45	0.2	65	×	×
	0.4	30	×	×
	0.8	72	×	🏳
	1.6	96	×	×
	3.2	96	×	×
60	0.2	34	40	🏳
	0.4	12	24	🏳
	0.8	14	30	🏳peeled off
	1.6	18	39	🏳 peeled off
	3.2	24	65	×
75	0.2	12	19	🏳
	0.4	5	7	🏳
	0.8	10	15	🏳 peeled off
	1.6	17	21	🏳 peeled off
	3.2	45	52	🏳 peeled off

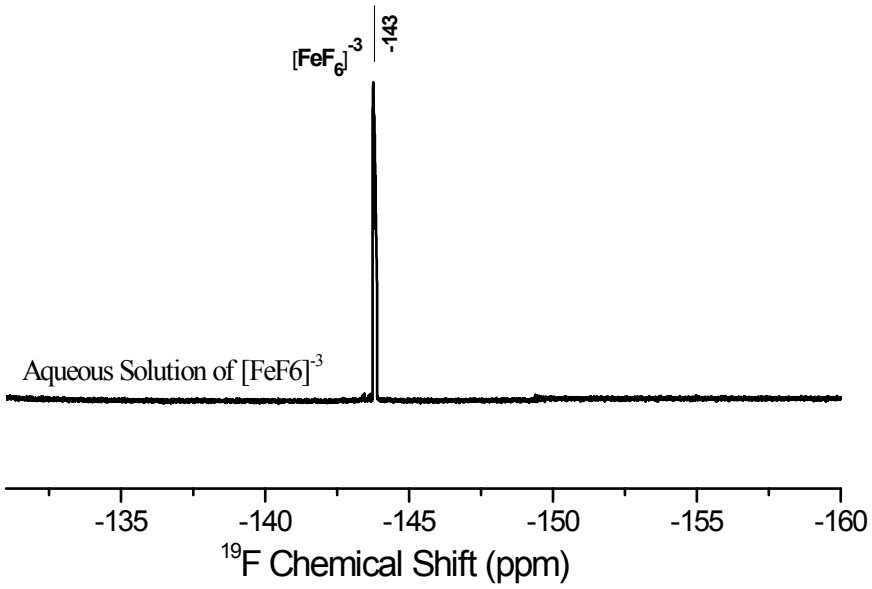

Fig. 1. ^{19}F-NMR spectrum of $[FeF_6]^{-3}$ complex

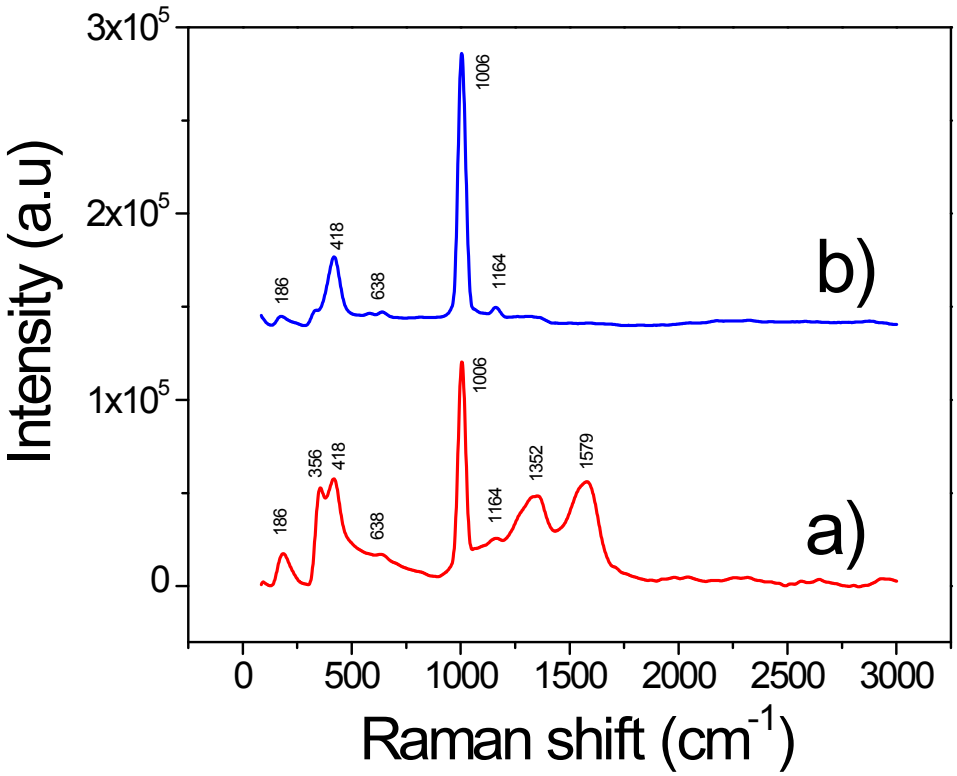

Fig. 2. Raman spectra of the powders obtained from the a) 0.4 and b) 1.6 dM treatment solutions

Raman spectra of the samples were recorded using Nicolet Almega dispersive Raman spectrometer (λex=532 nm). Raman spectra of the powders obtained from the 0.4 and 1.6 dM treatment solution are shown in Figure 2.a and b, respectively. The Raman peaks at 356, 1352 and 1579 cm^{-1} correspond to the lattice vibration modes of hematite-Fe_2O_3. The Raman peaks at 186, 418, 638, 1006 and 1164 cm^{-1} are the lattice vibration modes of α- quartz $FePO_4$.

Table 2. Rietveld fit parameters, refined lattice parameters, atomic positions and bond distances of the α- quartz $FePO_4$ with $P3_121$ space group

a=*b* (Å)	*c* (Å)	Volume (Å^3)	χ^2		R_{wp} (%)	R_p (%)
5.0232(5)	11.204(1)	245.83(5)	1.589		15.46	11.75
Atoms	Wyckoff Positions	Coordinates			Bond Distance (Å)	Uiso
		x	y	z		
Fe	3a	0.4533	0	0.3333	Fe-O_1:1.7897(1) Fe-O_2: 2.0457(2)	0.055(2)
P	3b	0.4387	0	0.8333	P-O_1:1.5736(1) P-O_2: 1.2190(1)	0.015(1)
O_1	6c	0.4235	0.3080	0.3997	-	0.026(1)
O_2	6c	0.4026	0.2030	0.8759	-	0.077(2)