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Electronic Supplementary

Solvent specific synthesis of nano corpse flowery Lithiated iron oxide as energy storage and gas sensing material

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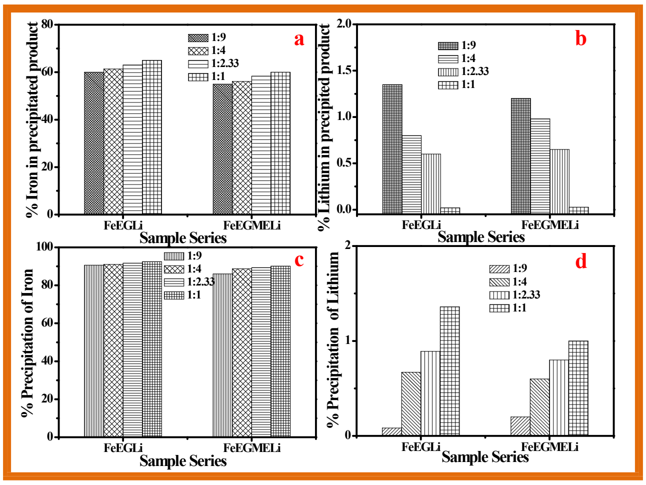

Figure S$_1$. Effect of ratio of Li:Fe on (a) % iron in precipitated product, (b) % Li in precipitated product, (c) % iron precipitation, and (d) % Li precipitation, during synthesis of iron oxide in EG and EGME solvent mediated precipitation routes.

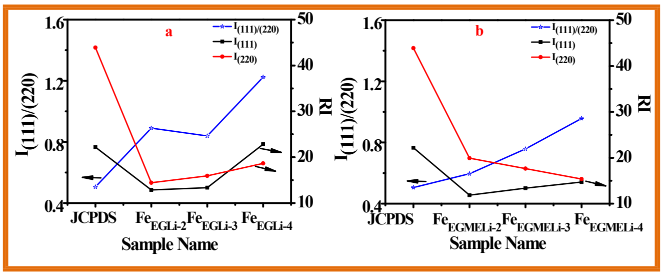

Figure S$_2$. Relative intensities of the planes (111), (220) and their ratio I(111)/(220) derived from XRD patterns of as synthesised $LiFeO_2$ samples (a) EG and (b) EGME solvent mediated precipitation routes.

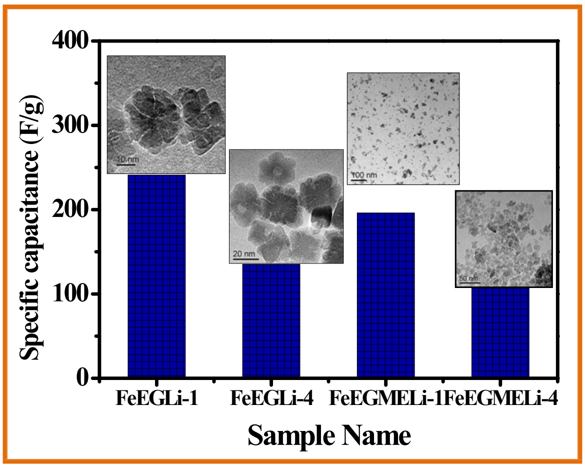

Figure S_3. Specific capacitance values obtained from CV curve for the samples synthesized in presence of Li in EG and EGME medium.

Table S_1. BET Surface areas, and pore volumes data of the samples synthesized in presence of Li in EG and EGME medium**.**

Sample Name	Surface area (m^2/g)	Pore volume (cm^3/g)
Fe_{EGLi-1}	123.9	0.3824
Fe_{EGLi-4}	40.86	0.1563
$Fe_{EGMELi-1}$	105.1	0.035
$Fe_{EGMELi-4}$	38.33	0.0234

Table S₂. Various Synthesis methods for α-$LiFeO_2$, their morphology and application reported in literature.

Synthesis Method	Phase	Morphology	Property	Ref.
Iron oxide +Lithium carbonate + 400–800^{0}C for 12h in argon atmosphere.	α-$LiFeO_2$	Spherical	Magnetic and electrochemical properties	[7]
α-FeOOH+ $LiNO_3$+LiOH Hydrothermal	α-$LiFeO_2$	------	Discharge capacity- 142 mAh/g)	[8]
LiOH·H_2O, 100 mM $LiNO_3$ and $FeCl_3$·6H_2O heated at 120 ºC in beakers for 4 h	α-$LiFeO_2$	Rock salt	Supercapacitor and battery	[9]
Ag(CH_3COO) solution +Li(CH_3COO) solution + isopropyl alcohol (3 mL) + Fe($C_5H_7O_2$)$_3$ at 400^{0}C for 12 h.	α-$LiFeO_2$	--------	Photovoltaic cell and Battery	[10]
α-FeOOH + $LiNO_3$ + LiOH heated at 523K , 3Kmin^{-1} for 3 h.	α-$LiFeO_2$	Rock-salt	50F/g SC	[11]
$FeCl_2$. 4H_2O + LiOH. H_2O +$LiNO_3$ + Li_2O_2 300^{0}C for 3 h in muffle furnace	α-$LiFeO_2$	Spheroidal	cathode material for lithium battery	[12]
α-FOOH + $FeCl_3$· 6H_2O+ LiOH·H_2O heated at 210°C, 6h	α-$LiFeO_2$	cubic rock-salt	Discharge capacity of 31 μAh/cm^2· μm	[13]
$FeCl_2$.6H_2O+ LiOH. H_2O +$LiNO_3$ + Li_2O_2 in alumina crucible and heated to 300^{0}C for 3 h in a muffle furnace	α-$LiFeO_2$	Clusters	High electronic conductivity	[14]
LiOH. H_2O + Fe (NO_3)$_3$· 9H_2O absolute alcohol, and then stirred for 3 h	α-$LiFeO_2$	10 nm spheroidal nanomaterial	Discharge Capacity of 101.5 mA h/ g after 50 cycles	[16]
Lithium hydroxide + □-FeOOH + 2-phenoxyethanol heated at 135–200^{0}C for 4 h	α-$LiFeO_2$	---------------	Li battery with cycling capacity	[17]
α-$NaFeO_2$ +Na_2CO_3 + Fe_2O_3 heated at 900 °C for 12 h in.	α-$LiFeO_2$	------------	Discharge capacity120 mAh/g at 100 mA/g	[18]
β-FeOOH +LiOH·H_2O +Li_2CO_3+ CH_3COOLi + $LiNO_3$ + ethanol solution At 85^{0}C.	α-$LiFeO_2$	Needle	Battery	[19]
LiOH. H_2O + Fe (NO_3)$_3$· 9H_2O in EG/EGME, stirred for 3 h, 100°C.	α-$LiFeO_2$	Flowery/ spheroid	Specific capacitance& gas sensor	This study