Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Self-Recovery in Li-Metal Hybrid Lithium-Ion Battery via WO_3 Reduction

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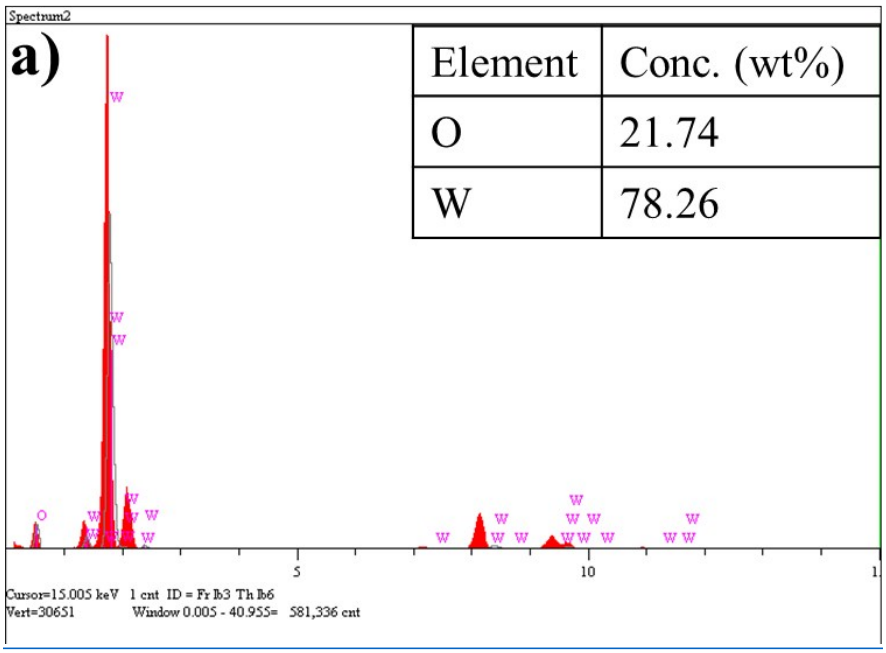


Figure S1. EDS of P-WO_3. Inset: percentage concentrations by weight of W and O in the P-WO_3

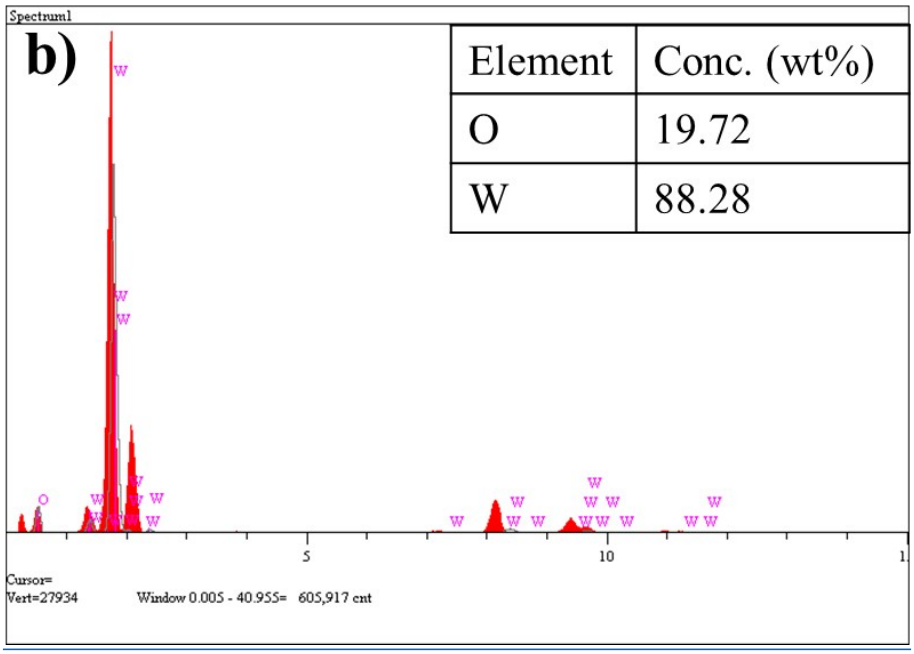
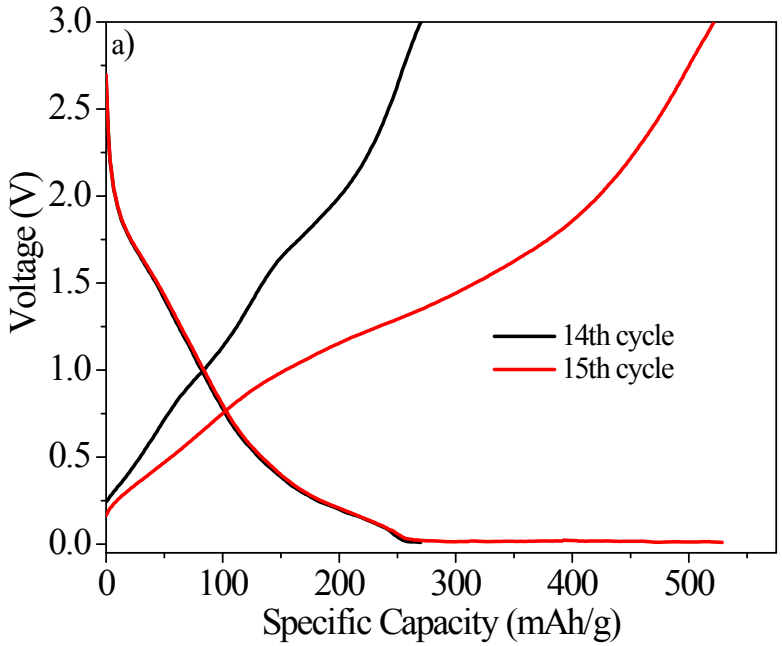


Figure S2. EDS of R-WO_3. Inset: percentage concentrations by weight of W and O in the R-WO_3



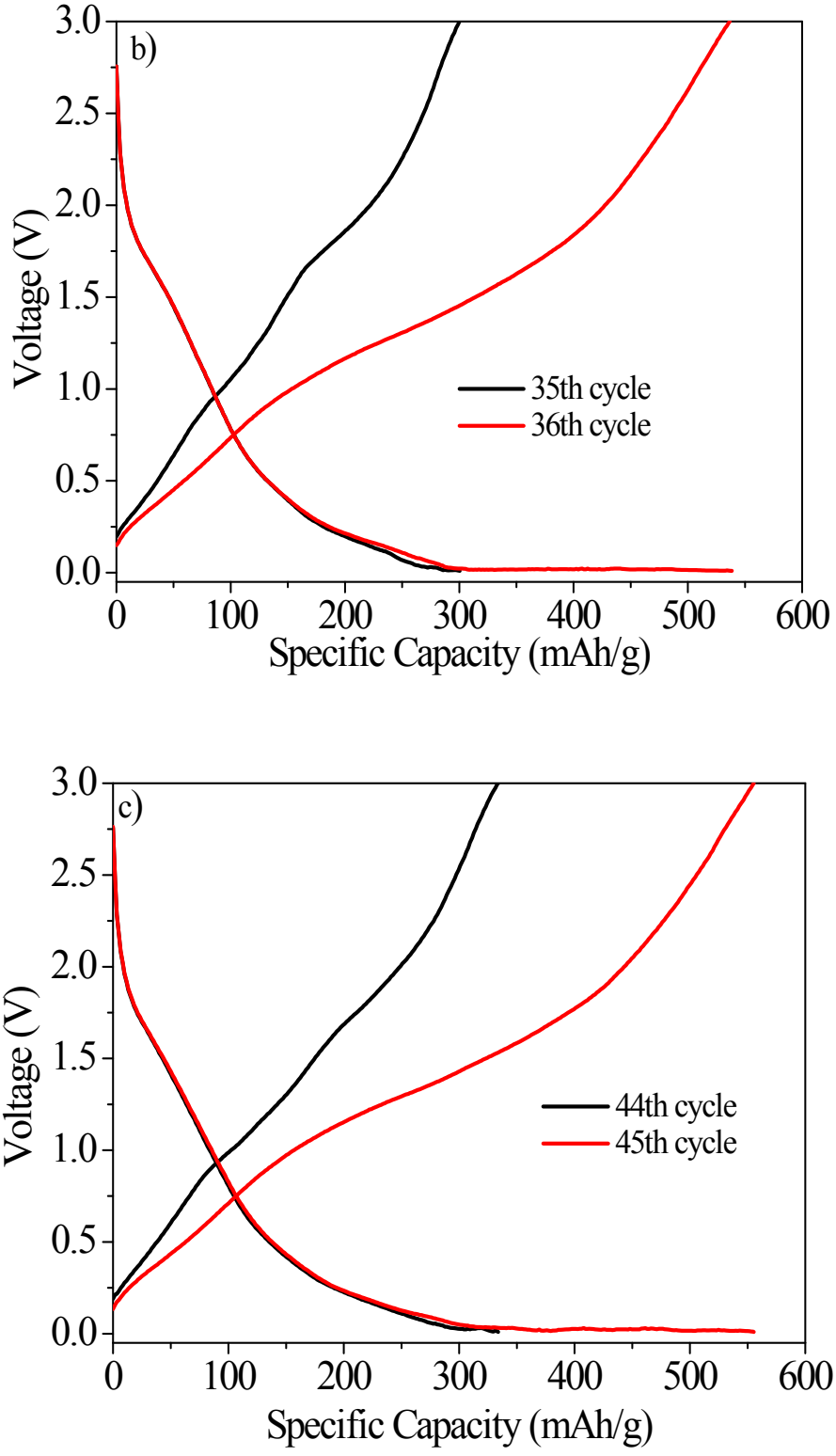


Figure S3. Self-recovery of capacity in R-WO_3 at the a) 15th, b) 36th cycle and c) 45th cycle.

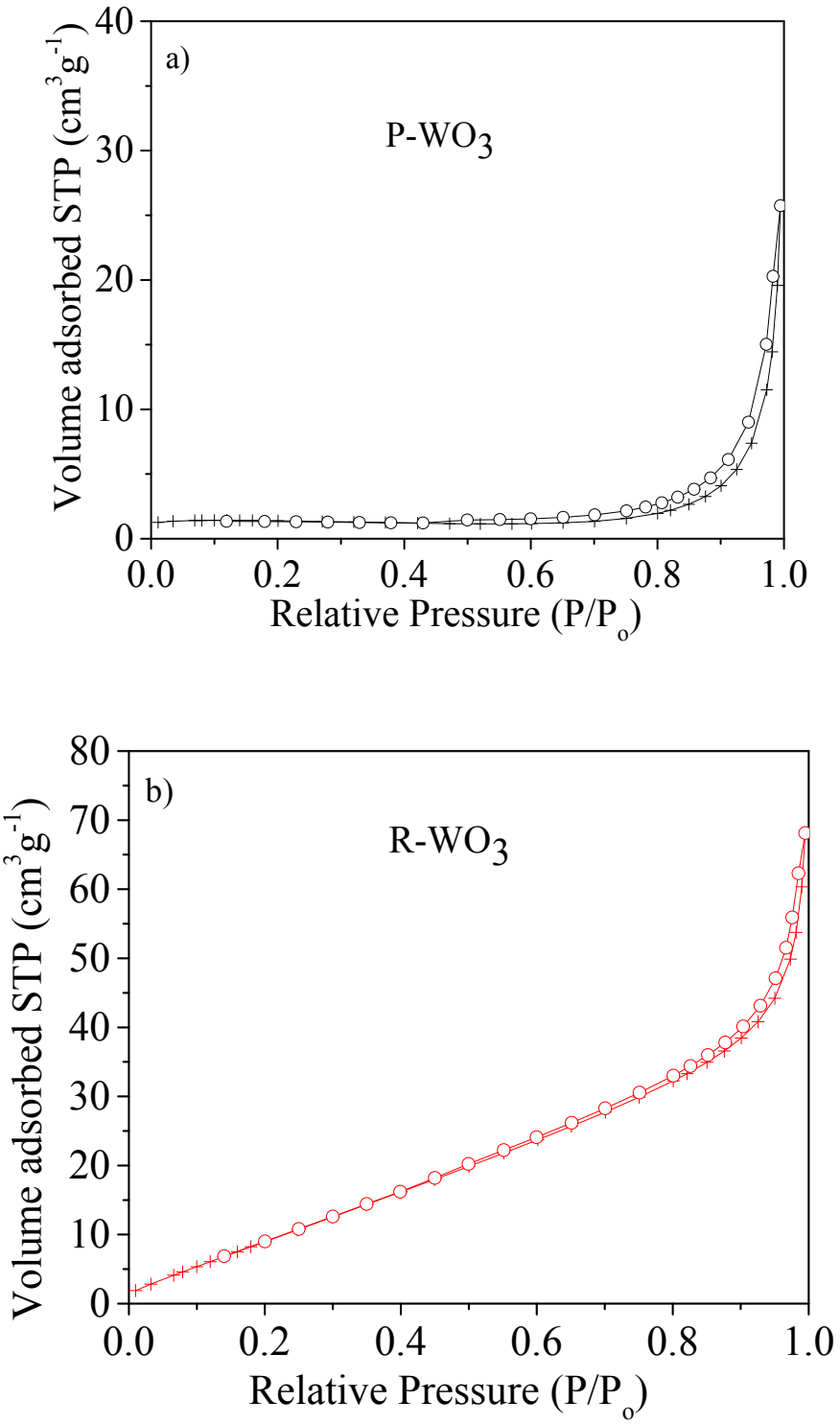


Figure S4. Nitrogen adsorption-desorption isotherms of a) P-WO and b) R-WO_3

Table S1. Estimation of crystallite size.

S.N	P-WO_3		R-WO_3	
	2-thetha (2θ)	**Crystallite Size (ang.)**	**2-thetha (2θ)**	**Crystallite Size (ang.)**
1	23.106	485	-	-
2	23.587	463	23.45	94
3	24.365	395	24.69	62
4	26.604	500	-	-
5	28.796	168	-	-
6	33.27	81.1	33.28	45.4
7	34.146	349	-	-
8	35.49	181	-	-
9	35.49	127	-	-
10	41.83	462	40.68	96
11	47.24	381	-	-
12	49.9	230	48.06	96
13	55.81	112	-	-
14	60.9	53	59.43	53
15	62.25	127	-	-
16	63.23	82	-	-
17	72.004	605	-	-
18	76.71	102	75.1	58
19	83.60	79	-	-
20	87.09	51	-	-

Table S2. Fitted impedance results of P-WO_3 and R-WO_3 using equivalent circuit

	R_s (Ohm)	**R_{ct} (Ohm)**	**CPE**	**W (Ohm.$S^{-1/2}$)**
P-WO_3	9.23	1195.00	$35.79*10^{-6}$	215.4
R-WO_3	8.87	135.10	$54.29*10^{-6}$	32.61

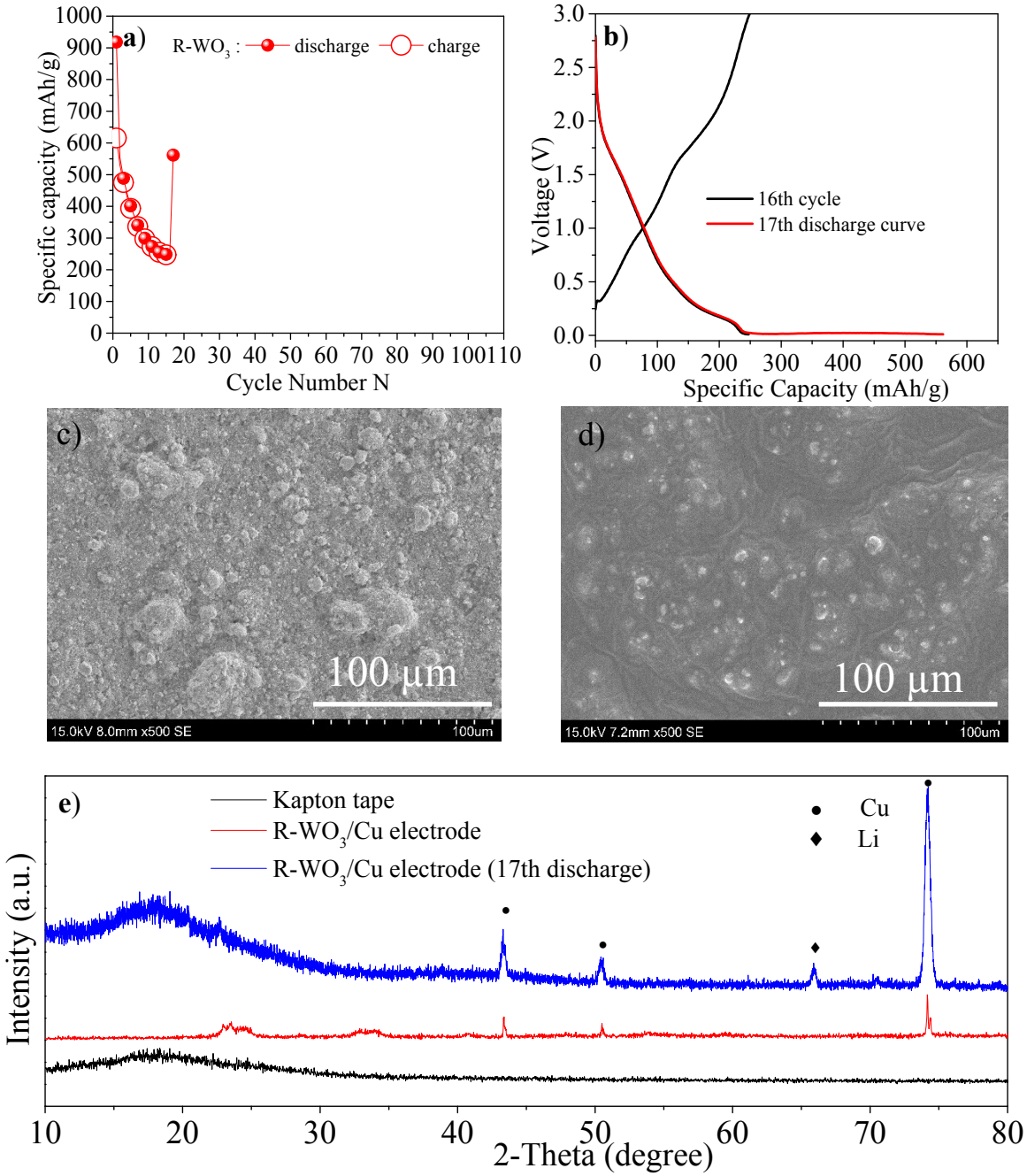


Figure S5. a) Specific capacity Vs Cycle number upto 17th discharge b) Self-recovery of capacity in R-WO_3 at 17th discharge c), d) SEM images of R-WO3 electrode before cycling and after 17th discharge e) XRD patterns of R-WO3 electrode before cycling and after 17th discharge