Electronic Supporting Information for

Egg-shell Structure $LiCoO_2$ by Cu^{2+} Substitution to Li^+ Site via Facile Stirring in an Aqueous Copper (II) Nitrate Solution

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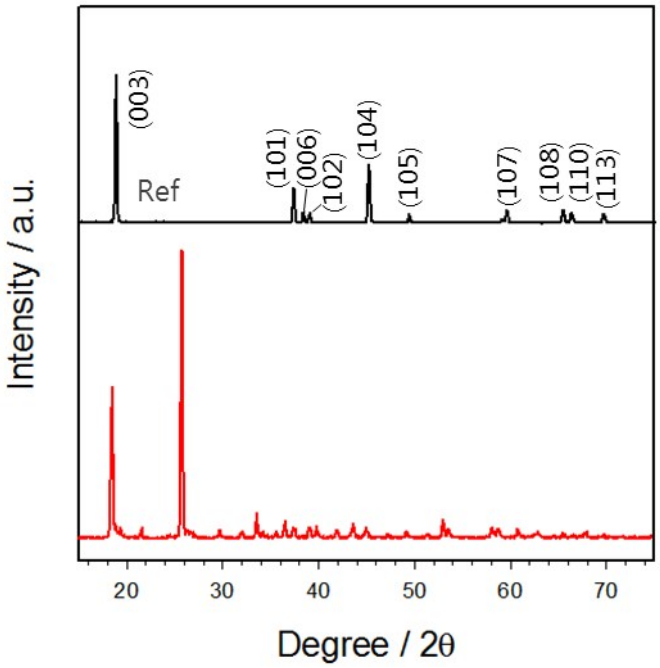

Fig. S1 XRD patterns from the stirred $LiCoO_2$ in the 5 M $Cu(NO_3)_2$ solution for 7 days.

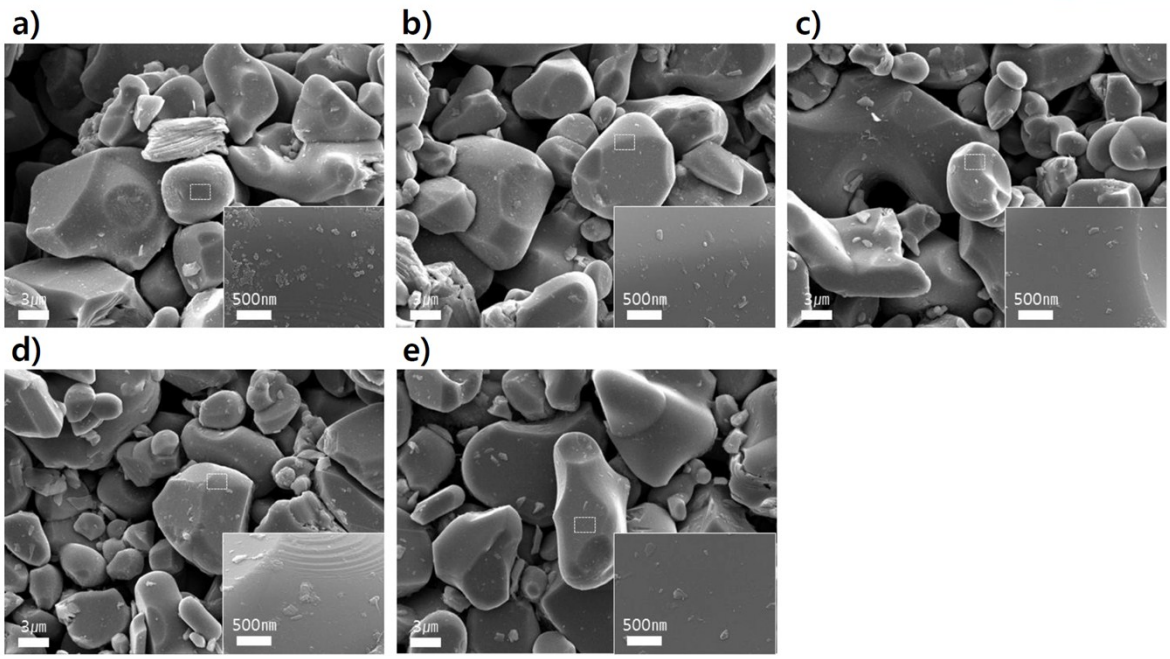

Fig. S2 SEM images of a) the bare $LiCoO_2$ and the surface modified $LiCoO_2$ after stirring in the 0.5 mM $CuNO_3$ solution by b) 6, c)24, d)72 and e) 144 hrs.

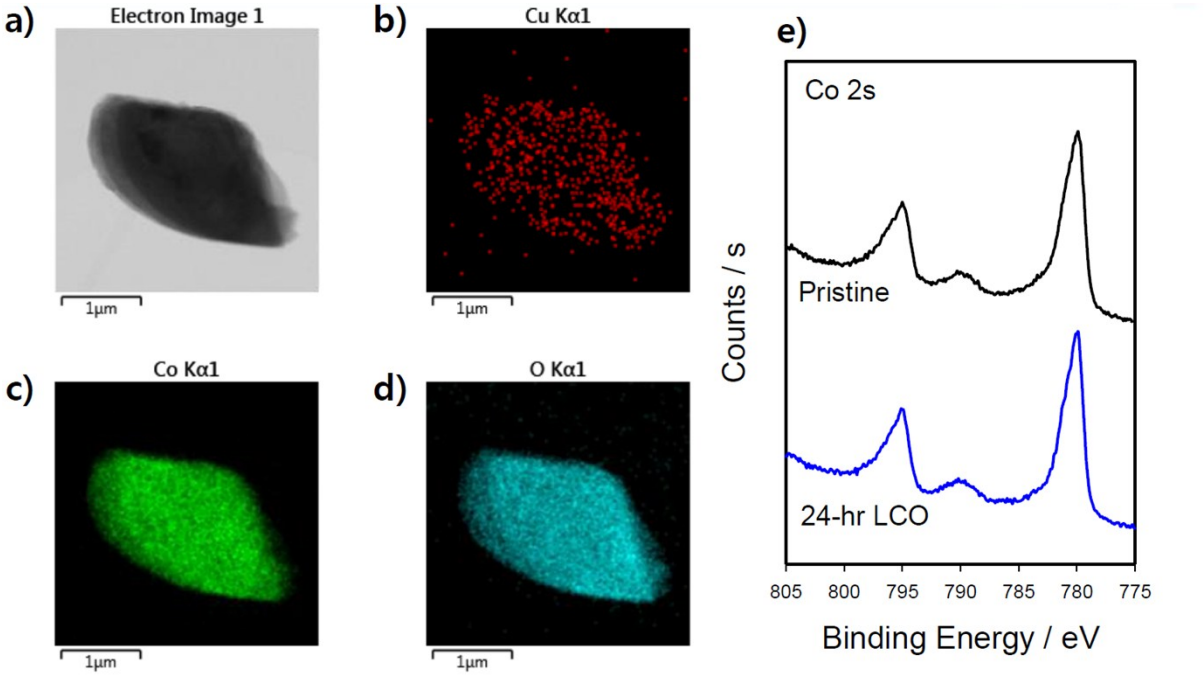

Fig. S3 a) TEM image of egg-shell structure $LiCoO_2$, b) EDS mapping images for b) Cu, c) Co and d) O. f) Co XPS spectra from the pristine and the 24 hr-LCO before cycling.

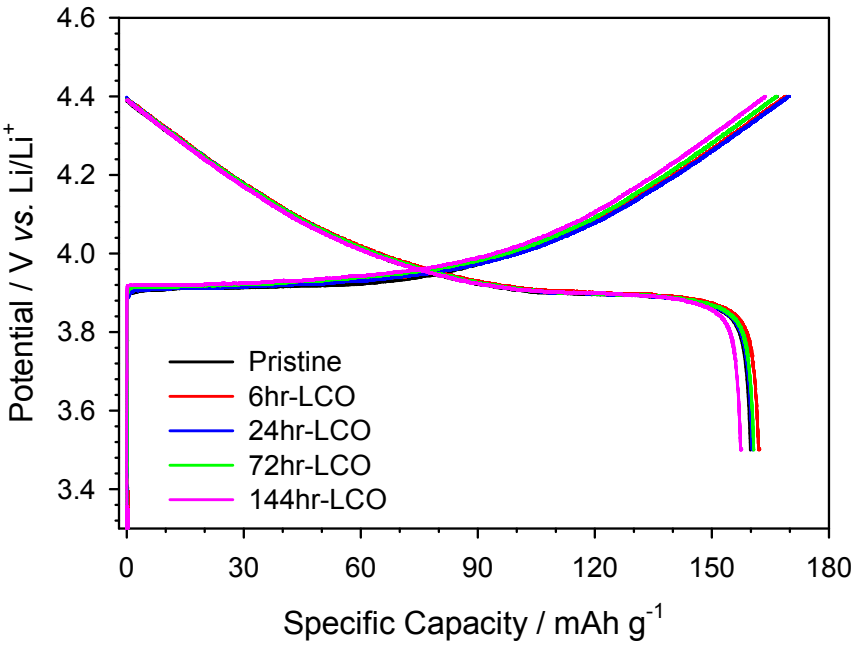

Fig. S4 Voltage curves at the 1st cycle from the coin type cells having pristine $LiCoO_2$ and the surface modified $LiCoO_2$ with different stirring time.

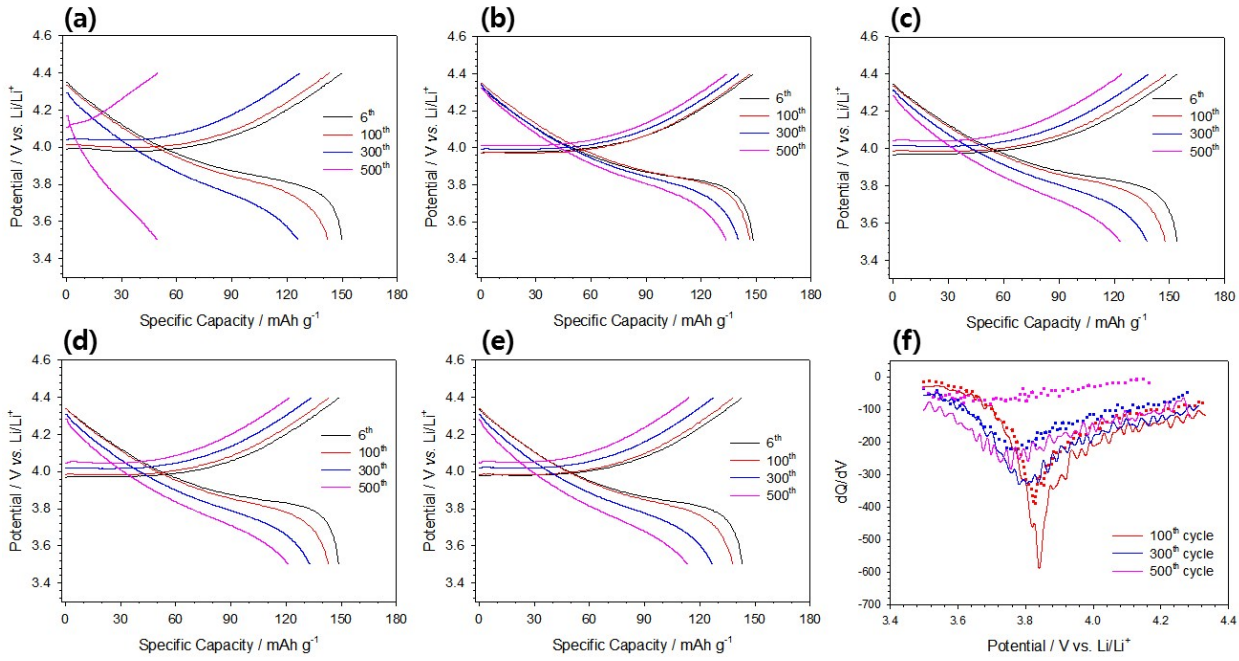

Fig. S5 Voltage curves obtained at the 6th, 100th, 300th and 500th cycle from the cell having a) pristine, b) 6hr-, c) 24hr-, d) 72hr-, and e) 144hr- LCO. f) The differential capacity vs. potential curves from the pristine and the 24hr-LCO cell are depicted.

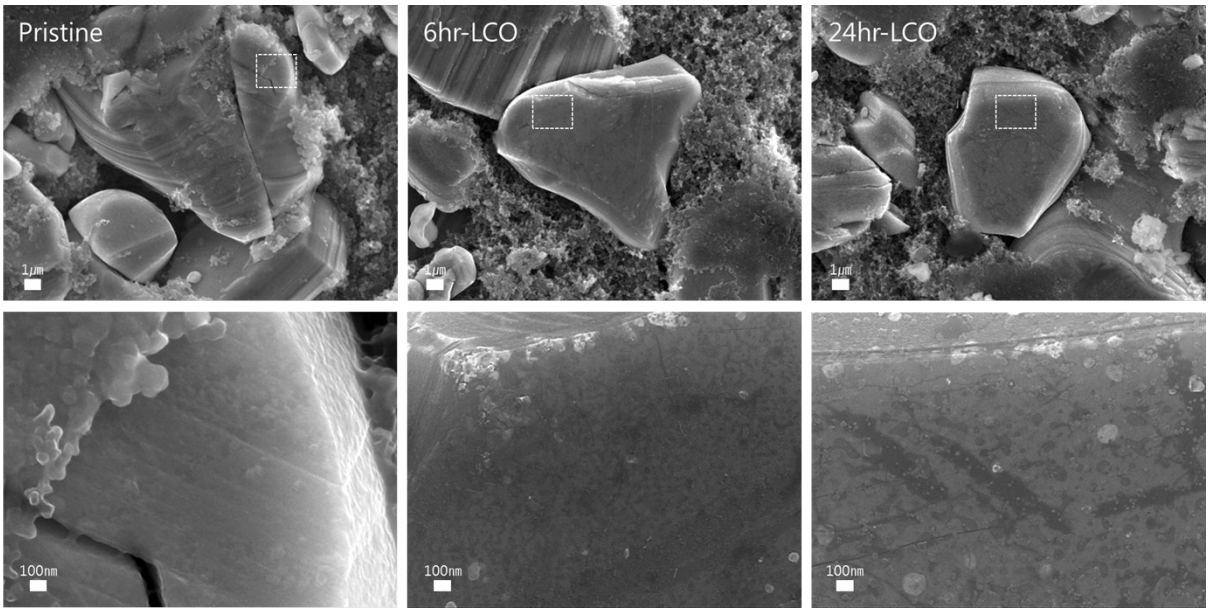

Fig. S6 FE-SEM images of the 500 times cycled electrode of a) pristine, b) 6hr-LCO and c) 24hr-LCO. Bottom images are enlarged one from the white dot square in upper images.

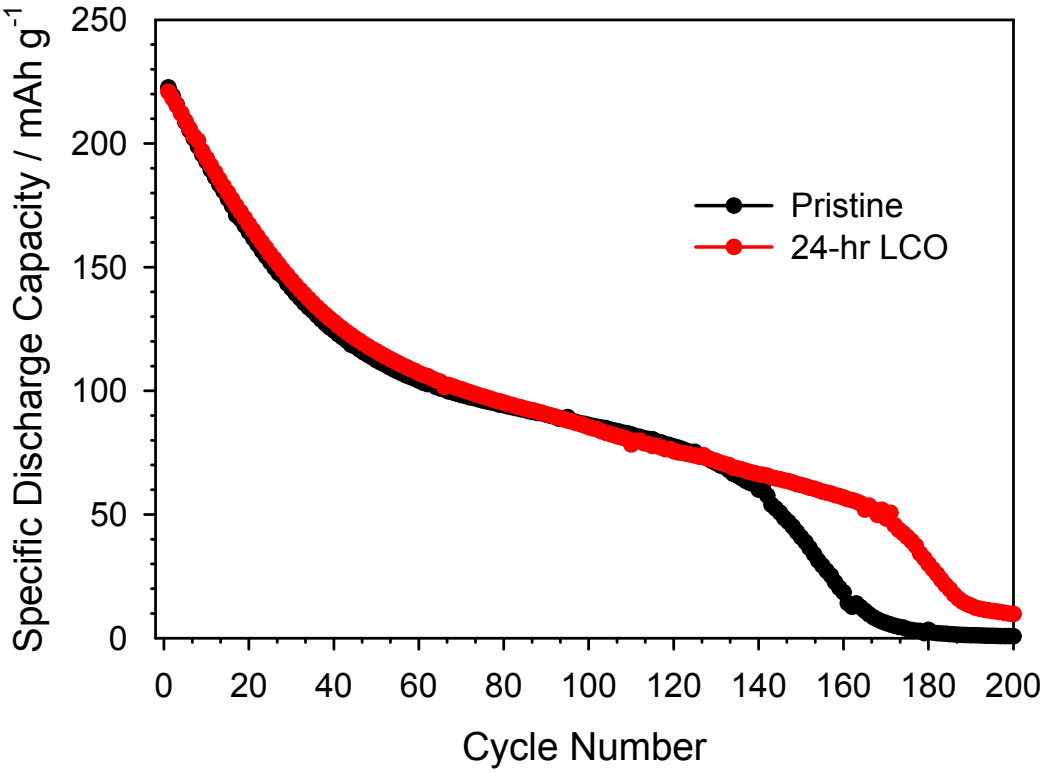

Fig. S7 Cycle life of the 2032 type coin cells having the pristine $LiCoO_2$ and 24-hr $LiCoO_2$ with a high cut-off condition of 4.6 V vs. Li/Li+ at room temperature.