A highly reversible Li-O₂ battery utilizing a mixed electrolyte 
and a Co₃O₄ catalyzed cathode

J. Zeng, C. Francia, J. Amici, S. Bodoardo*, N. Penazzi

Group for Applied Materials and Electrochemistry (GAME labs), Department of Applied Science and Technology (DISAT), Politecnico di Torino, C.so Duca degli Abruzzi 24, 10129 Torino, ITALY

Fig. S1 Nyquist plots of Li/electrolyte/Li symmetrical cells at ambient temperature. Frequency range: 1 Hz to 100 kHz. (Inset: high frequency response).
Fig. S2 Analysis of the pristine Csw carbon cathode: (a) XRD; (b) FESEM
Fig. S3 Characterizations of the cathode with 30 wt. % Co$_3$O$_4$ after cycling in the TEGDME electrolyte: (a) XRD pattern; (b) FESEM image. FESEM image of the synthesized Co$_3$O$_4$ particles (c).
Fig. S4 cyclic performance of Li-O\textsubscript{2} cells with carbon cathodes: (a) in EMITFS-TEGDME electrolyte; (b) in EMITFSI-DMSO electrolyte. Limited discharge capacity: 1.0 mAh cm\textsuperscript{-2}. Current rate: 0.1 mA cm\textsuperscript{-2}.
Fig. S5 Analysis on the anode of the cell using DMSO-EMITFSI electrolyte (see Fig. 6b) after cycling test: (a) FESEM image; (b) XRD pattern (ICDD database: Li, 00-001-1131; LiOH, 00-004-0708).