**Supporting Information**

***Electrochemical Characteristics of Lithium-Air Secondary Battery***

***Using Amide-Based Ionic Liquids***

Koichi UI,a, \*, § Sota NAKAMURA,a, §§ Yushi SATO,b Tatsuya TAKEGUCHI,a, §

and Masayuki ITAGAKIc, §

a *Graduate School of Arts and Science, Iwate University, 4-3-5 Ueda, Morioka, Iwate 020-8551,*

*Japan*

b *Graduate School of Engineering, Iwate University, 4-3-5 Ueda, Morioka, Iwate 020-8551,*

*Japan*

c *Department of Pure and Applied Chemistry, Faculty of Science and Technology, Tokyo*

*University of Science, 2641 Yamazaki, Noda, Chiba 278-8510, Japan; Research Institute for Science*

*and Technology, Tokyo University of Science, Noda, Chica 278-8510, Japan*

\**Corresponding Author: kui@iwate-u.ac.jp*

§ ECSJ Active Member

§§ ECSJ Student Member

**Figure S1.** Discharge-charge curves and overvoltages for LABs with various electrolytes after the 1st cycle at 298 K; current density: 50 μA cm−2; voltage range: 2.0 - 4.3V; limit capacity: 200 mAh (g-carbon)−1; loading weight of KB: 0.5 mg cm−2. The electrolytes are (a) Li-TFSA / G4, (b) LiNO3 + LiBr / G4, (c) Li-TFSA / Py13-TFSA, and (d) Li-TFSA / DEME-TFSA.



**Figure S2.** Discharge-charge curves and overvoltages for LABs with various electrolytes after the 50th cycle at 298 K; current density: 50 μA cm−2; voltage range: 2.0 - 4.3V; limit capacity: 200 mAh (g-carbon)−1; loading weight of KB: 0.5 mg cm−2. The electrolytes are (a) Li-TFSA / G4, (b) LiNO3 + LiBr / G4, (c) Li-TFSA / Py13-TFSA, and (d) Li-TFSA / DEME-TFSA.

**Table S1**. Comparison of the electrolyte type and the top frequency.

