

CLAIMS

1. A battery containing an electrochemical cell comprising
 - a negative lithium electrode;
 - 5 - a positive sulfur electrode, the sulfur electrode comprising an electrically conductive porous carbon matrix having pores containing sulfur;
 - a current collector abutting the sulfur electrode;
 - a separator arranged between the lithium electrode and the sulfur electrode;
 - an electrolyte arranged between the electrodes for transport of Li ions between the
 - 10 electrodes;wherein the electrolyte comprises Hexylmethylether, HME, 1,3 dioxolane, DOL, and a lithium salt, wherein the electrolyte between the electrodes is provided at an amount of less than 2 μ l per mg sulfur.
- 15 2. The battery according to claim 1, wherein at a ratio between HME and DOL is in the range of 2:1 to 1:2.
3. The Battery according to any preceding claim, wherein the Li salt is Bis(trifluoromethane)sulfonimide lithium salt, LiTFSI.
- 20 4. The battery according to claim 3, wherein the lithium salt in the electrolyte has a molar concentration in the range of 1M to 4M.
5. The Battery according to any preceding claim, wherein the electrolyte is configured
- 25 for dissolving only a fraction of available polysulfides during charge and discharge of the battery, the fraction being less than 5%.
6. The battery according to any one of the preceding claims, wherein the energy density of the electrochemical cell is higher than 400 Wh/kg for at least 5 cycles and higher
- 30 than 350 Wh/kg for at least 20 cycles, when charged and discharged at a charging rate of 0.1C.
7. The battery according to any one of the preceding claims, wherein the mass density of the positive electrode is higher than 0.55 g/cm³.

8. The battery according to any one of the preceding claims, wherein pores in the porous carbon matrix comprises pores with a pore volume, wherein at least 50% of the pore volume is defined by pores having an average pore diameter of less than 0.1 micron.

9. The battery according to any one of the preceding claims, wherein the battery is constructed and arranged to apply a force onto the electrochemical cell in a direction normal to the active surfaces of the electrodes during charging of the battery, the force being in the range of 10 to 50 N/cm².

10. The battery according to any one of the preceding claims, wherein the current collector is a perforated metal sheet with perforations, the perforations in total having an area of more than 50% of the area of one side of the metal sheet; wherein positive electrode is solidly bonded to the collector, forming an electrode/collector sheet unit.

11. The battery according to claim 10, wherein the battery comprises a plurality of electrochemical cells arranged as a stack with two neighboring cells sharing the said current collector, wherein the said current collector is sandwiched between the said sulfur electrode and a further identical sulfur electrode of a neighboring cell.

12. The battery according to claim 11, wherein the separator comprises a coating of the porous sulfur-containing porous carbon matrix for providing a combination of cathode and separator, wherein each two of such combinations are sandwiching one current collector with the cathode side facing the current collector and being fastened to the current collector, and wherein the combinations are fastened to each other by extending through the perforations of the current collector.

13. The battery according to any one of the preceding claims, wherein the stack is under pressure by a force in the range of 10 to 50 N/cm².

14. The battery according to any one of the preceding claims, wherein the electrolyte is free from lithium nitrate, LiNO₃.