

Performance of EMIMFSI ionic liquid based gel polymer electrolyte in rechargeable lithium metal batteries and effect of mesh type Al on capacity retention

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Flexible gel polymer electrolytes based on polymer polyethylene oxide, salt lithium bis(fluorosulfonyl)imide and ionic liquid 1-ethyl-3-methylimidazolium bis(fluorosulfonyl)imide are synthesized. Prepared samples show high thermal stability (up to 200°C), high ionic conductivity at room temperature and an electrochemical stability window of ~3.51 V vs. Li/Li⁺. Lithium deposition-stripping voltage profiles show the formation of a stable solid electrolyte interface. A Li/GPE/LiFePO₄ cell was assembled by low cost thermal lamination technique. This cell can deliver 143 mAh g⁻¹ capacity at room temperature at C/20 rate with good discharge efficiency. Use of micro grid mesh type Al current collector in double sided cathode exhibits significant improvement in capacity retention. This implies a better contact between current collector and cathode active material with improved mechanical stability can have significant effect on capacity retention.

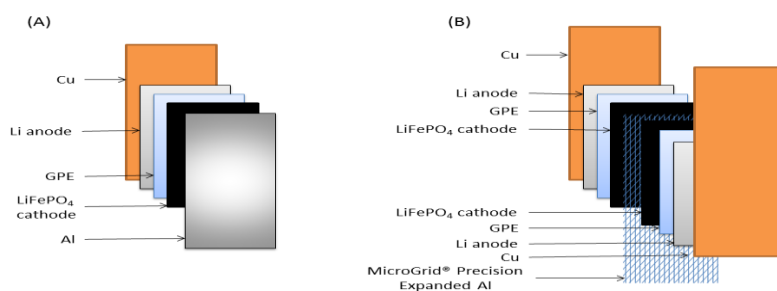


Figure 1 : Schematic diagram of (A) Cell-1 and (B) Cell-2

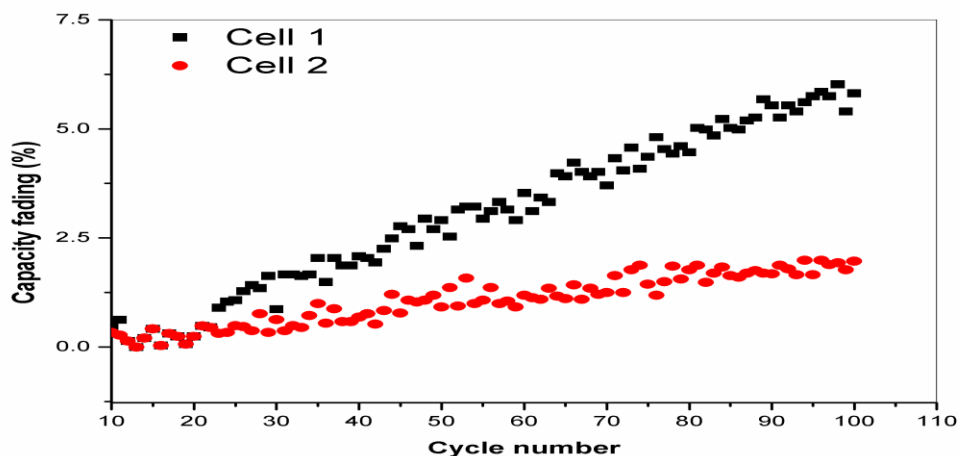


Figure 2 : Capacity fading of Cell-1 and Cell-2