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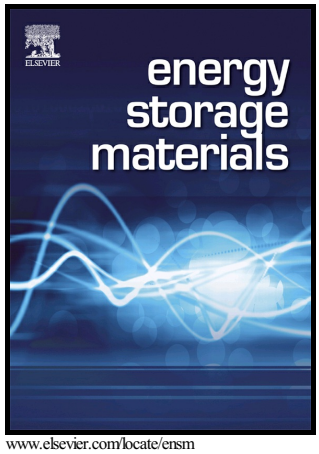

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Abstract

Overoxidised polypyrrole (PPy) paper has been employed as a mesoporous separator for lithium metal batteries (LMBs) based on its narrow pore size distribution, good thermal stability, high ionic conductivity (1.1 mS cm^{-1} with a LP40 electrolyte) and high electrolyte wettability. The overoxidised PPy paper was produced from a PPy/cellulose composite using a combined base and heat-treatment process, yielding a highly interrupted pyrrole molecular structure including N-containing polar groups maintaining the readily adaptable mesoporous-structure of the pristine PPy paper. This well-defined pore structure gave rise to