

# Functionalized lignin-contained nanofibrous separator with high stability for safe lithium-ion batteries by UV-electrospinning

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As an indispensable part of lithium-ion batteries, separators play a key role in influencing the performance of lithium-ion batteries. In this study, a functionalization of lignin-contained nanofibrous separator for the LIBs by UV-electrospinning technique was presented. First, biopolymer lignin was modified to obtain a UV-active maleated lignin (ML). Further, ML was combined with UV-curable formulations (up to 30 wt%) and physical, as well as electrochemical characteristics of PAN/ML/HMEMO/PEGDA (PMHP) separators were investigated (Fig.1). The produced electrospun PMHP separators with a thickness of 25  $\mu\text{m}$  enhanced their porosity, electrolyte uptake, heat resistance, and mechanical and electrochemical characteristics compared to a commercial Celgard-2400 separator due to their unique structure. The PMHP2 membrane with 20 % of ML content exhibited significantly higher ionic conductivity,  $2.79 \times 10^{-3} \text{ S cm}^{-1}$  than that of the same cell with commercial Celgard-2400 ( $6.5 \times 10^{-4} \text{ S cm}^{-1}$ ). Furthermore, Li dendrite formation was suppressed with the use of a PMHP2 membrane over lengthly 1000 cycles, which are proved by Li stripping/plating analysis.

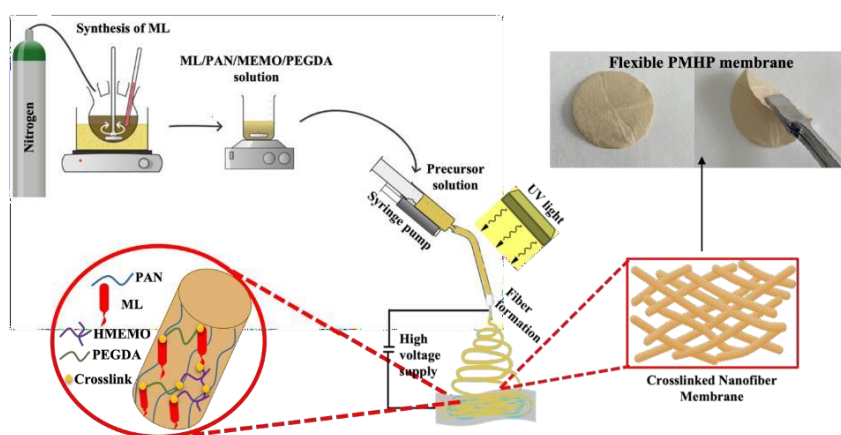


Figure 1. Schematic illustration of PMHP membrane by UV-electrospinning method

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