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## Electrospinning Synthesis of PET-AlN Composite Separators for Advanced Lithium-ion Batteries

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## **Electrospinning Synthesis of PET-AIN Composite Separators for Advanced Lithium-ion Batteries**

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**Abstract.** Plastics are indispensable materials in our society, widely adopted in food packaging, automotive, disposable medical equipment, and electronics, because of their favourable properties, including low density, high strength-to-weight ratio, high durability, ease of design and manufacture, and low cost. In this project, aluminium nitride/polyethylene terephthalate composite fibre-based non-woven membranes (AIN-PETs) were fabricated by electrospinning with dispersing different contents of aluminum nitride (0 to 5 %) in the recycled polyethylene terephthalate (PET) solutions and their electrochemical performance was evaluated for use as separators in lithium-ion batteries. The porosity of the AIN-PETs could reach 74.37 %, which was significantly higher than that of commercialized PP separator (Celgard® 2400) of 62.22 %. No apparent shrinkage and dimensional changes were observed for AIN-PETs with high contents of AIN at 100 °C for 120 minutes. Scanning electron microscope (SEM) observation, electrochemical impedance spectroscopy (EIS), and differential scanning calorimetry (DSC) were conducted in this study. The high porosity value resulted in the improved electrochemical performance for nanofiber separators. The AIN/PET separators prepared had high liquid electrolyte uptake, ionic conductivity, and thermal stability, which is comparable to the commercial microporous polyolefin membranes. The results obtained in this study will definitely enhance the understanding of the composite separator for advanced lithium-ion batteries.

**Keywords:** PET, Separator, Electrospinning, Lithium-ion batteries.

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