



(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2004/0224233 A1**

**Chen et al.**

(43) **Pub. Date: Nov. 11, 2004**

(54) **METHOD FOR PREPARATION OF CHEMICALLY CROSSLINKED POLYACRYLONITRILE POLYMER ELECTROLYTE AS SEPARATOR FOR SECONDARY BATTERY**

(52) **U.S. Cl.** ..... **429/303; 429/314; 429/316; 429/317; 429/307; 429/213; 429/231.95; 429/231.4**

(76) **Inventors: Show -An Chen, Hsinchu City (TW); Uan-Jie Xue, Hsinchu City (TW); Jen-Jeh Lee, Taipei City (TW); Po-Shen Wang, Jiali Jen (TW)**

(57) **ABSTRACT**

Correspondence Address:  
**RABIN & BERDO, P.C.**  
**Suite 500**  
**1101 14th Street, N.W.**  
**Washington, DC 20005 (US)**

A composite gel-type polymer electrolyte membrane, as a separator between the positive and the negative electrode for secondary battery, consists of crosslinked gel-type polyacrylonitrile (PAN) electrolytes, polyvinylidene fluoride (PVDF) polymers and liquid electrolytes. The crosslinked gel-type PAN electrolytes are copolymerized by acrylonitrile (AN) monomers and crosslinked monomers with two terminal acrylic acid ester function groups. The PVdF can be PVdF-co-HFP polymers containing over 80% PVdF. The liquid electrolytes are made from using nonaqueous solvents to dissolve alkaline or alkaline earth metallic salts. This invention has advantages of superior ionic conductivities and mechanical strength at high temperature, fine compatible to positive and negative electrodes and potential to be industrialized.

(21) **Appl. No.: 10/428,789**

(22) **Filed: May 5, 2003**

**Publication Classification**

(51) **Int. Cl.<sup>7</sup>** ..... **H01M 10/40; H01M 4/58; H01M 4/60; H01M 4/40**

