POLYMER ELECROLYTES BASED ON SODIUM POLY [4-STYRENESULFONYL (TRIFLUOROMETHYLSULFONYL) IMIDE] FOR SODIUM ION BATTERIES

Oihane Garcia-Calvo[a], Asier Fernandez de Añastro[a], Nerea Lago[a], Teófilo Rojo[a,b] and Michel Armand[a]

[a] *CIC Energigune, Parque Tecnológico de Álava*
Albert Einstein, 48, ED.CIC, 01510 Miñano, Álava, (Spain)
[b] *Departamento de Química Inorgánica, Universidad del País Vasco UPV/EHU*
P.O.Box.644, 48080, Bilbao, (Spain).

ogarcia@cicenergigune.com

Sodium batteries are an incipient and competitive alternative of lithium batteries due to principally low-cost and abundance of sodium [1–4]. The development of safe and reliable sodium electrolytes is a critical factor needed for their success. The criteria for choosing an electrolyte in sodium batteries are: wide electrochemical window, stability against metallic sodium or low voltage intercalation anodes, and high ionic conductivity [5]. The main challenge to overcome in that field is the compatibility between electrodes and electrolytes that will lead in an efficient cycling. One strategy is to use solid electrolytes and, in particular, polymer electrolytes because they exhibit advantages against ceramics in terms of processability. Some solid polymer electrolyte designs contain a polymeric anionic framework, in which only the cations are capable of diffusion, being the transference number of these electrolytes close to the unity.

Taking into account the recent research based on the synthesis of sodium poly[(4-styrenesulfonyl)(trifluoromethylsulfonlyl)imide] (PSTFSI-Na) solid polymer electrolytes [6], here we describe an study of the electrochemical behavior of PEO (M_w $5 \cdot 10^6$)/PSTFSI-Na blends as polymer electrolytes for rechargeable Na-ion batteries.

The electrochemical characterization of these materials showed the highest ionic conductivity at operational temperature (70ºC) of 10^{-5} S cm^{-1} when the ratio [EO]/[Na] is about 17. Moreover, the cyclic voltammetry and galvanostatic cycling results showed that the PEO/PSTFSI-Na blends could work as the electrolyte in an all-solid-state sodium-ion battery.

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