

March 26-28, 2018  
Vienna, Austria

Polym Sci, Volume 4  
DOI: 10.4172/2471-9935-C1-009

## IONIC LIQUID ASSISTED STABILIZATION OF POLYACRYLONITRILE PRECURSOR FIBRES

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In this study, effects of chemical treatment of polyacrylonitrile (PAN) fibres using 1-Ethyl-3-methylimidazolium acetate (EMIM-Ac) were investigated by adding EMIM-Ac in the post-spinning bath. Polymer dope was prepared by mixing 20 wt% of PAN in dimethylformamide (DMF) and then it was spun into a 60/40 DMF/water coagulation bath. 0.5, 1, 2, 5 and 10 wt% of EMIM-Ac was dissolved in post-spinning bath and fibres were immersed in the bath for 2, 5 and 10 minutes. Based on thermochemical and thermogravimetric analyses, low concentration of EMIM-Ac (0.5, 1 and 2 wt%) in the post spinning bath broadened the reaction temperature range. Then, a higher stabilization temperature is required to achieve the same extent of reaction at low temperature which is not interested. 5 wt% EMIM-Ac in the bath is the breakthrough concentration and an impregnation time longer

than 5 minutes accelerated the reaction. Adding 10 wt% EMIM-Ac to the bath stimulated stabilization at lower temperature. However, SEM images showed longer exposure time infused filaments to each other and derivative weight loss showed a severe thermal degradation above 500°C. Basicity of acetate anions plays a vital role in the autoxidation process of PAN precursor in the presence of heat and oxygen. This autoxidation process can be accelerated in the presence of water as it promotes abstraction of hydrogen from the  $\alpha$ -position relative to nitrile groups. As a result, conducting a post-spinning chemical treatment in a bath containing 10 wt% EMIM-Ac with 2 min exposure time reduces stabilization reaction temperature and reduces energy consumption.

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