ENHANCED IONIC CONDUCTIVITY OF CARBOXYLATED NITRILE RUBBER/MGAL-LDH COMPOSITES BY ADDING IMIDAZOLIUM IONIC LIQUIDS

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ABSTRACT

Nowadays there is a systematically growing tendency in employing of ionic liquids as performance additives in rubber compounds formulation due to their chemical stability, thermal stability, low vapor pressure and high ionic conductivity properties as well as their designable characteristics. The antielectrostatic properties[1], antimicrobial activity[2] and lubricant properties of ILs have been also recognized[3]. The most common reason for employment of ionic liquids in elastomer field is improvement of nanofillers dispersion (e.g. carbon nanotubes[4] carbon black[5] halloysite nanotubes[6], silica[7]) in hydrophobic matrix as well as enhancement ionic conductivity and mechanical properties of polymer composites.

In the present study we employed magnesium aluminium layered double hydroxide MgAl-LDH as a filler and as a curing agent simultaneously in carboxylated acrylonitrile-butadiene rubber XNBR. In this work we studied the effect of imidazolium salts on the morphology, mechanical, ionic conductivity and thermal properties of XNBR/MgAl-LDH composites that were prepared by conventional 2-step melt mixing method. The influence of imidazolium ionic liquids on magnesium-aluminum layered hydroxide MgAl-LDH activity in crosslinking of carboxylated acrylonitrile-butadiene elastomer (XNBR) was also investigated. The results show that imidazolium salt containing $AlCl_4$ ion is able to increase the efficiency of crosslinking XNBR. The presence IL consisted of bis(trifluoromethylsulphonyl) imide anion not only significantly increased the alternating current (AC) of electrical conductivity but also improved the state of dispersion of the filler nanoparticles as observed from scanning electron microscopy analysis.

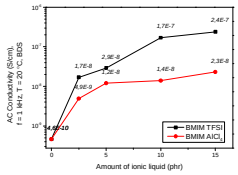

Figure 1. AC conductivity in function of IL amount in XNBR/MgAl-LDH composite.

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