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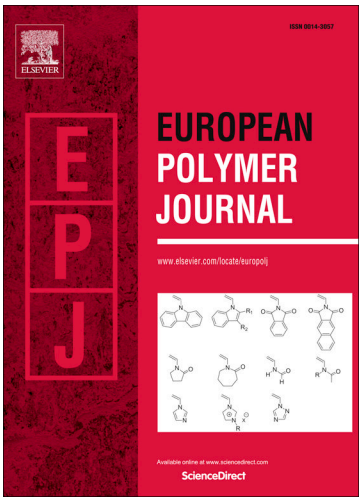

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POLY(IONIC LIQUID)S AS ANTIMICROBIAL MATERIALS

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Abstract

In the last few years, efforts to broaden PILs properties, structures, functionalities, and applications have grown rapidly. One of their interesting potential uses is as antimicrobial systems, due to their versatility and capacity to be adjusted in different morphologies, sizes, and surface charges. This review gathers the recent advances in antimicrobial materials based on PILs. Initially, the synthesis of PILs with antimicrobial activity, showing the influence of the chemical structure, whether is cationic or anionic and their corresponding counter-ions, is pointed out. Equally, most of these PILs present modest mechanical performance that turn researchers to overcome it by grafting them to different surfaces, crosslinked with other monomers or by simple blending with polymers. Moreover, the nature of PILs makes them regulators of size and shape of inorganic antimicrobial particles, enhancing their effectivity.

Keywords: PILs; antimicrobial; grafting; crosslinking; blending

1. Introduction

Nowadays, microbial infections have become again a public health concern, which has attained global interest in the development of new drugs. This is mainly due to the rapid increase of antimicrobial resistance, which is now accepted as an urgent problem to tackle [1-3]. Indeed, the World Health Organization (WHO) has developed a global action plan on antimicrobial resistance and a list of antibiotic resistant priority pathogens [4, 5]. In addition to make a use of antibiotics more responsible, the research and development of new and effective drug treatments are imperatively required. However, developing of new antibiotics is not economically attractive to pharmaceutical companies due to several reasons [6]. The low cost of antibiotics together with their relatively short periods of consumption and the new practices, which lead to the reduced use of new antibiotics to limit the development of resistance, are some causes that diminish the return on investment for the industry. Besides, the emergence of resistance to the new drugs is practically inevitable and the timeline for bacterial evolution is unpredictable.

Then, to face the threat of antimicrobial resistance, new systems have been development as alternative to antibiotics, including silver nanoparticles [7, 8], carbon-based nanomaterials [9], antimicrobial peptides [10, 11], cationic compounds [12] and antimicrobial polymers [13-15], among others. Antimicrobial polymers and in particular cationic polymers have emerged as interesting and promising systems. Compared to conventional antibiotics, which affect to a specific biological