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CHEMICAL RECYCLING PROCESSES OF WASTE TIRES TO RECOVER FUNCTIONALIZED RUBBER

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PURPOSE OF THE ABSTRACT

Due to the large amount of polymer production, the chemical recycling of polymers waste, is of major importance [1]. This process consists in the conversion of polymer waste into monomers or reactive functional polymers and in their use for the development of new high value polymers. In this regard, the recycling of waste tires, is still a challenge.

The major part of the tire is composed of a mix of different natural rubbers, such as polyisoprene (PI), or artificial rubbers, such as polybutadiene (PB) or styrene?butadiene rubber, whose proportions depend on their use. The ideal recycling processes are the devulcanization, consisting in breaking C?S and/or S?S bonds and depolymerisation/degradation, consisting in breaking C=C bonds: these chemical strategies lead to rubber polymers that can be used as feedstocks, and are a logical and ideal solution to develop a circular economy approach.

In this context, we have reported new efficient processes of the chemical recycling of waste tires. The first one is based on the ruthenium-metathethic degradation of grounded waste tires, which allows to simultaneously recover the elastomers and to functionalize the obtained oligomers by the use of various chain transfer agents during the depolymerisation process [3]. Different telechelic polymers and oligomers were synthesized with a low dispersity and with various terminated group such as acetoxy, phosphonated, phosphonic acid? The second process is based on radical devulcanization reaction using functionalized peroxide derivatives as devulcanizing agents, to recover the functionalized elastomers in high yields and with a low dispersity. Ester, halogenated, nitro? functionalized rubber polymers were synthesized and could be further used in various fields such as plasticizers, adhesives, lubricants, additives, and so forth.

FIGURES

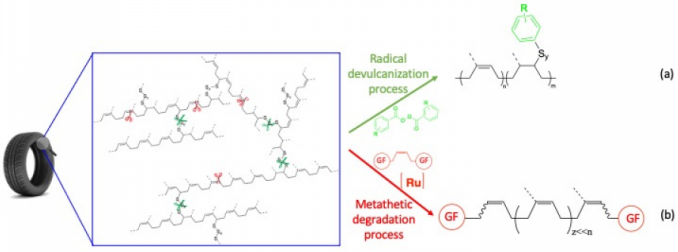

FIGURE 1

Chemical recycling processes

(a) Radical devulcanization process; (b) Metathetic degradation process

FIGURE 2

KEYWORDS

rubber recovery | degradation | devulcanization | waste tires

BIBLIOGRAPHY