

(40~80 ℃),当硫黄用量为 0.5 份时出现了 $\tan\delta$ 峰,随着硫黄用量的增大,EUG 硫化胶的 $\tan\delta$ 整体下降。

(5)随着硫黄用量的增大,EUG 硫化胶的 T_r 呈减小趋势, R_f 先增大后减小, v_r 先减小再增大后减小;当硫黄用量为 1 份时,EUG 硫化胶的 R_f 和 v_r 最大。

参考文献:

- [1] 姚薇,贺爱华,宋景社,等. 反式 1,4-聚异戊二烯的结晶行为[J]. 合成橡胶工业,1996,19(5):287-289.
- [2] Yan R F. Verfahren Zum Herstel Lenvon Gummi aus Transpolyisoprene[P]. German:DE 3227757,1984-10-04.
- [3] 夏绘秦. 杜仲胶作为工程性材料开发的可行性探究[J]. 中国西部科技,2003(4):9-10.
- [4] Wei Z G, Miyazaki S, Sandstrom R. Shape-memory Materials and Hybrid Composites for Smart Systems. Part I. Shape-memory Materials[J]. Journal of Materials Science, 1998, 33(15):3743-3762.
- [5] Li C, Qin H, Mather P T. Review of Progress in Shape-

- memory Polymers[J]. Journal of Materials Chemistry, 2007, 17(16):1543-1558.
- [6] Lendlein A, Kelch S. Shape-memory Polymers[J]. Angewandte Chemie International Edition, 2002, 41(12):2034-2057.
- [7] Li F K, Yang J P, Xu M, et al. Polyurethane/Conducting Carbon Black Composites: Structure, Electric Conductivity, Strain Recovery Behavior, and Their Relationships[J]. Journal of Applied Polymer Science, 2000, 75(1):69-70.
- [8] 徐福勇,柏林,张和伟,等. TPI 形状记忆性能研究[J]. 橡胶工业,2010,57(7):406-409.
- [9] 马祖伟,黄宝琛,宋景社,等. 反式 1,4-聚异戊二烯的硫化特性及硫化胶的性能[J]. 合成橡胶工业,2001,24(2):83-84.
- [10] Marc B, Andreas L. Shape-memory Polymers[J]. Materials Today, 2007, 10(4):21.
- [11] 杨青,郑百林,武秀根,等. 形状记忆高分子材料记忆行为机理的理论分析[J]. 材料工程,2006(S1):492-494.
- [12] 刘天琦,杨凤,方庆红,等. 天然胶/杜仲胶共混硫化物结晶性对热致形变回复性能的影响[J]. 沈阳化工大学学报, 2014, 28(1):47-51.

收稿日期:2015-02-01

Effect of Sulfur on Shape-memory Property of Eucommia Ulmoides Gum

HOU Jin-yan¹, MA Qing-chi¹, ZHANG Pei-wen¹, ZHANG Rui¹, FANG Qing-hong^{1,2}

(1. Shenyang University of Chemical Technology, Shenyang 110142, China; 2. Education Department of Liaoning Province, Key Laboratory of Applied Technology of Polymer Materials, Shenyang 110142, China)

Abstract: The effect of addition level of sulfur on the shape-memory property of eucommia ulmoides gum was investigated. When the addition level of sulfur increased, the M_L of the compound changed little, the M_H increased, and the t_{90} was shortened at first and then extended. Meanwhile, the crosslink density of the vulcanizates tended to increase, the modulus and tensile strength decreased at first and then increased, the thermal stimulation response temperature tended to decrease, and the final deformation recovery rate increased at first and then decreased. When the addition level of sulfur was 1 phr, the physical properties and thermal induced shape-memory property of the vulcanizates were the best.

Key words: sulfur; eucommia ulmoides gum; shape-memory material; crosslink density; thermal induced shape-memory property

一种汽车盘式刹车片

中图分类号: TQ333.7; TQ336.4 文献标志码: D

由青岛华瑞胶业设备有限公司申请的专利(公开号 CN 103573888A, 公开日期 2014-02-12)“一种汽车盘式刹车片”, 涉及的刹车片配方为: 丁腈橡胶 10~16, 腰果壳油改性酚醛树脂 10~25, 石墨 5~15, 粉煤灰 10~20, 碳酸钙

6~10, 增磨剂 3~8, 焦炭粉 3~20, 钾长石粉 5~10, 二硫化钼 1~2, 云母 5~20, 余量为环氧树脂。该配方采用腰果壳油改性酚醛树脂, 不仅能降低污染、净化环境, 而且能充分利用废物、回收资源和能源, 符合国家节能减排、废弃物资源化利用、可持续发展的基本国策。

(本刊编辑部 赵敏)