表3　填充炭黑N550/5 μm隐晶质石墨AEM胶料性能

项　目	5 μm隐晶质石墨用量/份			
	0	12	24	36
炭黑N550用量/份	60	48	36	24
门尼粘度[ML(1+4)100 ℃]	38	38	32	30
硫化胶性能				
邵尔A型硬度/度	70	68	65	64
拉伸强度/MPa	15.6	15.1	15.1	12.6
拉断伸长率/%	267	349	426	434
撕裂强度/(kN·m^{-1})	45	46	43	42
压缩疲劳温升[1)]/℃	43.9	43.9	42.6	48.4
压缩永久变形/%	38	39	39	47
3#标油浸泡(120 ℃×72 h)				
后体积变化率/%	32	33	34	35
150 ℃×70 h热空气老化后				
邵尔A型硬度变化/度	+2	+5	+3	+1
拉伸强度变化率/%	+4	+9	+7	+7
拉断伸长率变化率/%	−3	−1	−2	−2

注:1)同表2。

来看,对于拉伸强度要求高的AEM胶料,可采用5 μm隐晶质石墨替代部分炭黑N550,替代比例不宜超过30%。

3　结论

在AEM胶料中,45 μm粒径的隐晶质石墨可部分替代炭黑N550,替代比例不宜超过40%;对于拉伸强度要求高的AEM胶料,适合采用5 μm隐晶质石墨部分替代炭黑N550,替代比例不宜超过30%。

总的来看,对于AEM胶料,炭黑N550/隐晶质石墨并用,可以大大缩短胶料的硫化时间,在保持耐油性能和耐老化性能的前提下,降低生热和原材料成本。

收稿日期:2017-06-20

Application of Cryptocrystalline Graphite in Ethylene-Acrylate Rubber

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Abstract: Cryptocrystalline graphite was used in the ethylene-acrylate rubber (AEM) compound to replace part of the carbon black N550 and its effect on the properties of the compound was investigated in this study. The results showed that the vulcanization time of AEM compound with part of the carbon black replaced by cryptocrystalline graphite was significantly shortened, the oil resistance and heat aging resistance were maintained, the heat build-up and the cost of raw materials were reduced. The replacement of carbon black N550 by cryptocrystalline graphite with an average particle size of 45 μm was inadvisable to exceed 40%. In the compound for high tensile strength performance, cryptocrystalline graphite with an average particle size of 5 μm was more suitable to replace part of the carbon black N550, but the ratio should not exceed 30%.

Key words: cryptocrystalline graphite; ethylene-acrylate rubber; carbon black N550; heat build-up; compression set

炭黑/纳米纤维素并用以降低轮胎滚动阻力

中图分类号:TQ330.38^{+}1　　文献标志码:D

博拉炭黑公司与美国过程公司(API)签订合作开发协议,研究通过炭黑与纳米纤维素并用以提高轮胎性能的技术。初步研究表明,博拉炭黑公司的Birla Carbon炭黑与API公司的BioPlus纳米纤维素并用具有协同作用,可显著降低轮胎滚动阻力。

API公司开发出BioPlus纳米纤维素生产工艺,产品可用于包括塑料及橡胶增强领域。API公司表示,BioPlus纳米纤维素除了具有不同寻常的可持续性优势外,还能使各种材料(包括橡胶)的性能得到极大的提升。纳米纤维素的强度与碳纤维相当,可以提高复合材料的强度、耐久性和韧性等。在复合材料中,纳米纤维素表现出与其他填料如炭黑的协同效应。博拉炭黑公司表示,炭黑和纤维素之间的协同作用有助于帮助轮胎制造商达到轮胎性能和环保方面的要求。

(朱永康)