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改性树脂基滑板的制备及其热磨损性能

陈振华，涂川俊，陈 刚，严红革，夏金童

(湖南大学 材料科学与工程学院，长沙 410082)

摘 要：采用共混改性的聚双马来酰亚胺树脂(PBMI)/腰果壳油改性酚醛树脂(YM)为粘结剂，添加导电相、润滑相和增强纤维相，利用热轧混料，二次热模压及通氢固化等工艺制得改性树脂基受电弓滑板试样。利用TG、DTG和DSC分析方法对树脂基体进行热分析，通过环块磨损试验机对滑板/铜环的高温、干态磨损性能进行测试，利用SEM方法对滑板的磨损形貌进行观察和分析，进而探讨滑板/铜环的热态磨损机制。结果表明：PBMI/YM改性树脂的耐热性优于YM树脂，PBMI/YM改性树脂基滑板的耐磨性明显优于YM树脂基滑板。在环境温度为350 ℃、磨损时间为30 min时，YM树脂基滑板的磨损率和摩擦因数分别为23.57×10^{-7} $cm^3/(N\cdot m)$和0.232；而PBMI/YM改性树脂基滑板的则分别为9.88×10^{-7} $cm^3/(N\cdot m)$和0.144。在磨损过程中，随着环境温度的增加，树脂基滑板/铜环的磨损机制发生由粘着磨损向伴随有轻微剥层磨损的热磨损转变。

关键字： PBMI/YM；树脂基滑板；共混；热态磨损；磨损机制

Preparation and thermal wear properties of modified resin-matrix pantograph contact strip

CHEN Zhen-hua, TU Chuan-jun, CHEN Gang, YAN Hong-ge, XIA Jin-tong

（College of Materials Science and Engineering, Hunan University, Changsha 410082, China）

Abstract: Abstract: With polybismaleimide resin(PBMI)/cashew nut oil modified phenol formaldehyde resin(YM) as bonding agent, and other electric conductive phase, lubricating phase and intensifier fiber, modified resin-matrix pantograph contact strip was produced by the processes of hot rolling, dually heated die-pressing and hydro-solidification technology. The thermal properties of resin matrix were characterized by TG , DTG and DSC. The wear properties of the contact strip against copper were evaluated by the ring block wear tester at elevated temperature under dry sliding conditions. The morphologies of the worn surfaces of YM and PBMI/YM contact strip samples were examined by scanning electron microscope(SEM), and the wear mechanism of the contact strip against copper was also studied. The experimental results indicate that the heat resistance of the PBMI/YM modified resin is better than that of the YM resin. The PBMI/YM modified resin-matrix contact strip against copper has superior wear resistance at elevated temperature than that of unmodified one

under the same conditions. At initial environmental temperature of 350℃ and wear time of 30 min, the wear rate and the kinetic friction coefficient of the YM resin-matrix contact strip are 23.57×10−7 cm3/(N·m) and 0.232; while those of the PBMI/YM modified resin-matrix contact strip are 9.88×10−7 cm3/(N·m) and 0.144. At elevated temperature, the wear mechanism of the resin-matrix contact strip against copper evolves from adhesion wear to thermal wear with slight delamination wear.

Key words: PBMI/YM; resin-matrix contact strip; blending modification; thermal wear; wear mechanism

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765，8877197，8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn