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Article

Effect of SiC Concentration on the Microstructure and Anti-Wear Performance of Electrodeposited Ni-SiC Composite Coatings Constructed for Piston Ring Application

Fengwu Zhang [1,†], Qiuhua Wang [2], Huajie Shen [3], Caixia Bai [3], Chaoyu Li [1,*,†], Dehao Tian [4,*] and Baojin Wang [4]

[1] School of Mechanical and Electrical Engineering, Sanming University, Sanming 365004, China; 20230368@fjsmu.edu.cn
[2] Yunnan Key Laboratory of Forest Disaster Warning and Control, College of Civil Engineering, Southwest Forestry University, Kunming 650224, China; qhwang2010@swfu.edu.cn
[3] School of Design, Fujian University of Technology, Fuzhou 350118, China; shenhuajie@fjut.edu.cn (H.S.); 2242007004@fjut.edu.cn (C.B.)
[4] School of Mechanical Science and Engineering, Northeast Petroleum University, Daqing 163318, China; bjwangbaojin@nepu.edu.cn
* Correspondence: 208001040066@stu.nepu.edu.cn (C.L.); 238003040822@stu.nepu.edu.cn (D.T.)
† These authors contributed equally to this work.

Abstract: At present, the improvement of anti-wear performance of piston rings remains a challenge. In this article, Ni-SiC composite coatings fabricated at 3, 9, and 15 g/L SiC were denoted as NSc-3, NSc-9, and NSc-15 coatings. Meanwhile, the influence of SiC concentration on the surface morphology, phase structure, microhardness, and anti-wear performance of electrodeposited Ni-SiC composite coatings were investigated utilizing scanning electron microscopy, X-ray diffraction, a microhardness tester, and a friction–wear tester, respectively. The SEM images presented NSc-9 coatings with a compact, flat, or cauliflower-like surface morphology. The cross-sectional morphology and EDS results showed that the Si and Ni elements were uniformly distributed in the NSc-9 coatings with dense and flat microstructures. Moreover, the average grain size of the NSc-9 coatings was only 429 nm. Furthermore, the microhardness and indentation path of the NSc-9 coatings were 672 Hv and 13.7 μm, respectively. Also, the average friction coefficient and worn weight loss of the NSc-9 coatings were 0.46 and 29.5 mg, respectively, which were lower than those of the NSc-3 and NSc-15 coatings. In addition, a few shallow scratches emerged on the worn surfaces of the NSc-9 coatings, demonstrating their outstanding anti-wear performance when compared to the NSc-3 and NSc-15 coatings.

Keywords: Ni-SiC composite coatings; electrodeposition; microstructure; anti-wear performance; piston ring

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1. Introduction

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论文作者：张凤武

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经检索，张凤武(英文：Zhang, Fengwu)发表的“Effect of SiC Concentration on the Microstructure and Anti-Wear Performance of Electrodeposited Ni-SiC Composite Coatings Constructed for Piston Ring Application”论文被 SCIE 收录。

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序号	题名	来源出版物	文献类型	责任者说明	影响因子（IF）	JCR 分区	中科院分区	出版时间	入藏号
1	Effect of SiC Concentration on the Microstructure and Anti-Wear Performance of Electrodeposited Ni-SiC Composite Coatings Constructed for Piston Ring Application	MATERIALS	Article	第一作者	3.1（2023）	CHEMISTRY, PHYSICAL Q3（90/178） MATERIALS SCIENCE, MULTIDISCIPLINARY Q2（208/439）	大类3区；小类3区、4区	2025 MAR	WOS:001442567100001

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作者: Zhang, FW (Zhang, Fengwu); Wang, QH (Wang, Qiuhua); Shen, HJ (Shen, Huajie); Bai, CX (Bai, Caixia); Li, CY (Li, Chaoyu); Tian, DH (Tian, Dehao); Wang, BJ (Wang, Baojin)

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KeyWords Plus: WEAR; MICROHARDNESS; COMBUSTION; RESISTANCE; PARTICLES

地址: [Zhang, Fengwu; Li, Chaoyu] Sanming Univ, Sch Mech & Elect Engn, Sanming 365004, Peoples R China.

[Wang, Qiuhua] Southwest Forestry Univ, Coll Civil Engn, Yunnan Key Lab Forest Disaster Warning & Control, Kunming 650224, Peoples R China.

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论文作者：张凤武

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详见附件，特此证明。

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[Shen, Huajie; Bai, Caixia] Fujian Univ Technol, Sch Design, Fuzhou 350118, Peoples R China.
[Tian, Dehao; Wang, Baojin] Northeast Petr Univ, Sch Mech Sci & Engn, Daqing 163318, Peoples R China.
通讯作者地址: Li, CY (通讯作者), Sanming Univ, Sch Mech & Elect Engn, Sanming 365004, Peoples R China.
Tian, DH (通讯作者), Northeast Petr Univ, Sch Mech Sci & Engn, Daqing 163318, Peoples R China.
电子邮件地址: 20230368@fjsmu.edu.cn; qhwang2010@swfu.edu.cn; shenhuajie@fjut.edu.cn; 2242007004@fjut.edu.cn; 208001040066@stu.nepu.edu.cn; 238003040822@stu.nepu.edu.cn; bjwangbaojin@nepu.edu.cn
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