外语能力：

4、 外语能力证书

全国大学英语四级考试
成绩报告单

CET®

姓　名：王英东
学　校：西南林业大学
院　系：机械与交通学院
身份证号：[redacted]

笔试

总分	听力 (35%)	阅读 (35%)	写作和翻译 (30%)
428	153	155	120

考试时间：2023年3月

口试

等级	--

准考证号：--
考试时间：--

成绩报告单编号：222153006004660

教育部教育考试院
证书专用章

校验码：KYTL 9EUQ 2V53 GFGW

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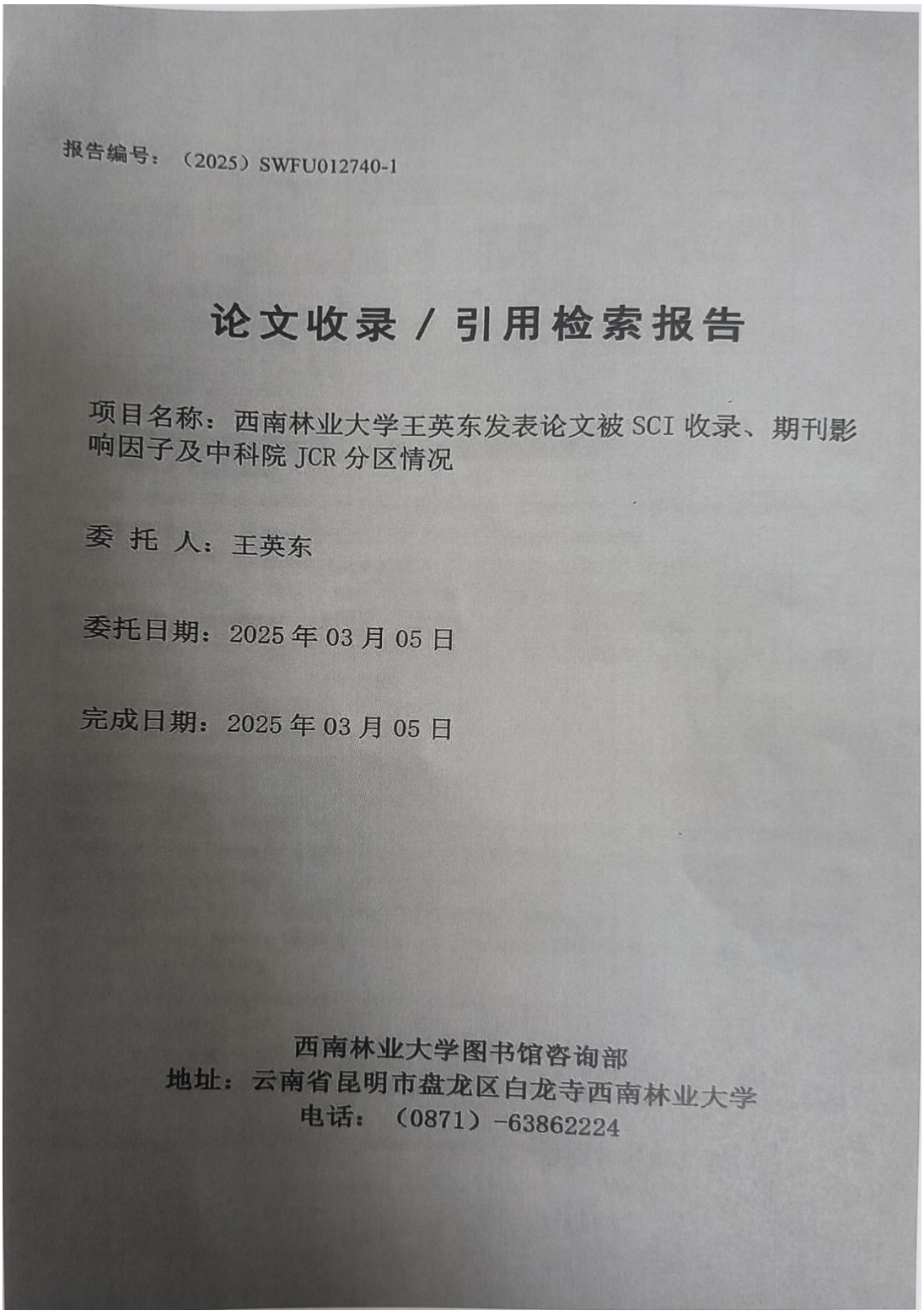

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论文收录／引用检索报告

项目名称：西南林业大学王英东发表论文被 SCI 收录、期刊影响因子及中科院 JCR 分区情况

委 托 人：王英东

委托日期：2025 年 03 月 05 日

完成日期：2025 年 03 月 05 日

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一、 项目的技术要求

西南林业大学机械与交通学院王英东发表论文被 SCI 收录、期刊影响因子及中科院 JCR 分区情况。

标题：略

二、情报检索情况

1. 检索数据库：Science Citation Index Expanded(SCI-E) 网络版
   Journal Citation Reports（JCR）
   中科院 JCR 分区数据库

2. 检索式：略

三、检出文献情况（编号、名称、文献题目及出处）

（一）SCI-E 收录情况

1. 标题：Synergistic Effect of Fe-Amorphous and Bionic Microtexture in Enhancing High-Temperature Tribological Properties of Al-12Si Piston Materials

作者： Wang, YD(Wang, Yingdong)[1];Lin, ZX(Lin, Zuxiang)[1];Yin, CB(Yin, Chengbin)[1];Kong, DT(Kong, Detong)[1];Zhao, DY(Zhao, Deyong)[1];Wang, ZJ(Wang, Zhijun)[2];Ma, BB(Ma, Beibei)[1];Xu, ZH(Xu, Zehua)[3];Wang, Y(Wang, Yuan)[1];

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DOI：10.1007/s12666-024-03455-0

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文献类型： Article;

地址： [1]Southwest Forestry Univ, Coll Mech & Transportat Engn, Kunming 650224, Peoples R China; [2]Univ Texas Arlington, Arlington, TX 76019 USA; [3]Kunming Inst Phys, Kunming 650217, Peoples R China;

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2. 标题：Corrosion behavior of Fe amorphous/Al-12Si piston composites with core-shell structure

作者： Wang, YD(Wang, Yingdong)[1];Lin, ZX(Lin, Zuxiang)[1];Liu, CZ(Liu,

Chengzhou)[1];Zhao, DY(Zhao, Deyong)[1];Li, CQ(Li, Chunqiong)[1];Wang, Y(Wang, Yuan)[1];
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（二）期刊影响因子（IF）

期刊名称	影响因子（2023）
TRANSACTIONS OF THE INDIAN INSTITUTE OF METALS	1.5
SCIENTIFIC REPORTS	3.8

（三）中国科学院 JCR 期刊分区(2023 年)

期刊全称	ISSN	所属大类	大类分区	Top 期刊
TRANSACTIONS OF THE INDIAN INSTITUTE OF METALS	0972-2815	材料科学	4	不是
SCIENTIFIC REPORTS	2045-2322	综合性期刊	2	不是

四、检索结论

依照用户委托，通过国际联机数据库检索，具体结果如下：

（一）SCI 收录：西南林业大学王英东以第一作者发表的 2 篇论文被 SCI-E 收录。

（二）期刊影响因子见上表；

（三）中国科学院 JCR 期刊分区见上表。

以上检索结论可在 SCI-E、JCR、中国科学院 JCR 期刊分区数据库中检索、验证。

检索员（签字）：杨冬

检索员职称：馆员

审核员（签字）：

审核员职称：研究馆员

西南林业大学图书馆咨询部

2025 年 03 月 05 日

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Corrosion behavior of Fe amorphous/Al-12Si piston composites with core-shell structure

Yingdong Wang, Zuxiang Lin, Chengzhou Liu, Deyong Zhao, Chunqiong Li & Yuan Wang✉

The current piston material, Al-12Si, lacks sufficient passivation in the acidic lubrication system of biodiesel engines, making it prone to corrosion in the presence of Cl^-. Fe amorphous particles exhibit good compatibility with Al-12Si, possessing strong corrosion resistance, excellent passivation ability, and good high-temperature stability. They are a potential reinforcement for enhancing the Al-12Si piston material. Fe amorphous/Al-12Si core-shell structural composites (FACS) were synthesized through ball milling and hot extrusion. The composites' composition, microstructure, and elemental distribution were characterized by X-ray diffraction, optical microscopy, and EDS spectroscopy. To accelerate the evaluation process, Potentiodynamic polarization and Electrochemical impedance spectroscopy were used to study the electrochemical corrosion behavior. By analyzing the self-corrosion current density (i_{corr}), self-corrosion potential (E_{corr}), polarization resistance, inductance, admittance absolute value (Y_0), and diffusion coefficient (n), the mechanism of Fe amorphous particle doping in enhancing the corrosion resistance of Al-12Si was discussed. The research results indicate that: The Fe amorphous particles, during ball milling and hot extrusion at 440 °C, do not recrystallize and maintain their good passivation ability. Spherical Fe amorphous particles act as "balls bearings" during hot extrusion, enhancing flowability and promoting the formation of a core-shell structure FACS with uniform composition distribution, high relative density, and low porosity when doping with 2–10% Fe amorphous particles. This prevents the formation of local potential differences, making the potential on the alloy surface more uniform, which helps reduce the risk of galvanic corrosion and improves corrosion resistance. However, when the doping content of Fe amorphous particles reaches 20%, excessive doping particles squeeze and rub against each other during hot extrusion, leading to amorphous agglomeration, low relative density, and high porosity defects in the resulting FACS, which causes uneven potential, increases local potential differences, and reduces corrosion resistance. Compared to Al-12Si, FACS doped with 2–10% Fe amorphous particles shows a decrease in i_{corr} from 254.66 μA/cm² to 114.98 μA/cm², and an increase in E_{corr} from 766.89 mV to 794.78 mV, indicating a reduced corrosion rate with the doping of an appropriate amount of Fe amorphous particles. As the doping content of Fe amorphous particles increases from 2 to 10%, the polarization resistance increases, indicating improved corrosion resistance; the inductance increases, suggesting that corrosion primarily occurs at the surface; Y_0 increases, and n decreases, indicating a reduction in the depth of the corrosion reaction, and the stability of the surface protective oxide film is improved. However, when the doping content of Fe amorphous particles reaches 20%, the opposite effect occurs, and the corrosion resistance of the FACS decreases. Notably, FACS with 10% Fe amorphous particles exhibited the strongest corrosion resistance, making it a potential candidate for biodiesel engine pistons.

Keywords Al-12Si piston alloy, Corrosion, Fe/Al-12Si, Amorphous-crystalline materials, Core-shell structure

As fossil fuels deplete, biomass fuels like biodiesel and bioethanol are becoming viable alternatives due to their environmental benefits[1]. Biodiesel combustion is not sufficient, the unburned fuel with incomplete combustion

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ORIGINAL ARTICLE

Synergistic Effect of Fe-Amorphous and Bionic Microtexture in Enhancing High-Temperature Tribological Properties of Al-12Si Piston Materials

Yingdong Wang[1] · Zuxiang Jin[1] · Chengbin Yin[1] · Detong Kong[1] · Deyong Zhao[1] · Zhijun Wang[2] · Beibei Ma[1] · Zehua Xu[3] · Yuan Wang[1]

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Abstract This study designs new Fe-amorphous/Al-12Si piston composite materials. The effect and synergistic mechanism of the addition of Fe-amorphous and bionic microtexture laser surface on the high-temperature friction performance of Al-12Si piston material under mixed lubrication conditions of B30 biodiesel and engine lubricating oil have been studied. The results indicate that the frictional properties of the untextured surface of the Fe-amorphous/Al-12Si composite material depend primarily on the amount of Fe-amorphous added. The 10 wt% Fe-amorphous/Al-12Si composite exhibits a dense, void-free microstructure with optimum anti-friction and anti-wear performance. It is noteworthy that the interaction between the "anchoring" effect caused by the Fe-amorphous addition and the synergistic effect of the bionic microtexture providing a stable lubricating environment further enhances the high-temperature friction properties of Al-12Si.

Keywords Fe-amorphous · Bionic microtexture · Al-12Si piston alloy · High-temperature tribological properties

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1 Introduction

Aluminum matrix composites (AMCs), as the most commonly used material for the industrial production of diesel engine pistons, cannot spontaneously generate a solid-state phase transition, and the potential difference between its internal metal matrix and the precipitated phase can easily form a microscopic corrosion battery [1]. When it is used as a piston material in the lubrication system of biodiesel engines with high acid value and strong corrosiveness, its corrosion resistance is insufficient, and the positive interaction between metal corrosion and wear will further exacerbate its corrosion and wear [2], leading to premature corrosion and wear failure.

In order to improve the friction and wear performance of AMCs, researchers commonly reinforce AMCs with ceramic particles, quasicrystalline materials, high-entropy alloys or amorphous materials. The addition of ZrC ceramic particles significantly reduces the friction coefficient and wear amount of Al-12Si [3]. Similarly, TiC possesses higher hardness and wear resistance than aluminum alloys, and they play a significant reinforcing role within the aluminum matrix. When subjected to friction, these hard ceramic particles can resist wear and reduce material loss, as evidenced by the study conducted by Ali Samer et al. [4], which shows that with increasing TiC ceramic particle content, the tribological properties of Al-12Si are effectively improved. However, the poor wettability of ceramic particles with AMCs, large difference in thermal diffusion coefficients and weak interfacial bonding strength, such as the commonly used SiC particles, are prone to brittle fracture by reacting with Al to form Al4C3, which seriously degrades their mechanical properties [5].On the other hand, while quasicrystalline materials possess high hardness and favorable friction-reducing and wear-resistant properties [6, 7], their application in AMCs is hindered by complex preparation