

## 研究论文

### Nd对AZ91镁合金显微组织和耐腐蚀性能的影响

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**摘要:** 用金相显微镜、扫描电镜和静态质量损失法对AZ91-xNd镁合金(x=1.1%, 1.4%, 1.9%)的微观组织和腐蚀性能进行表征, 研究了Nd对AZ91镁合金显微组织和耐腐蚀性能的影响。结果表明: 稀土Nd的添加明显细化了合金的组织, 使半连续网状 $\beta$ (Mg<sub>17</sub>Al<sub>12</sub>)相变为细小的长条状, 且分布更加均匀。在合金中还生成了颗粒状的Al<sub>3</sub>Nd; 稀土Nd显著提高了镁合金的耐腐蚀性能。添加1.4%Nd的镁合金耐腐蚀性能最佳, 平均腐蚀速率为0.1708 mg·cm<sup>-2</sup>·d<sup>-1</sup>, 为AZ91合金的20%。

**关键词:** 材料失效与保护 镁合金 Nd 显微组织 腐蚀性能

### Effect of Nd Addition on Microstructure and Corrosion Resistance of AZ91 Magnesium Alloy

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**Abstract:** The microstructure and corrosion behavior of AZ91 magnesium alloys with Nd addition were characterized by optical microscopy, scanning electronic microscopy, and the static mass loss method, the effect of Nd addition on microstructure and corrosion resistance of AZ91 magnesium alloy was investigated. The results show that the trace addition of Nd refines the microstructure of AZ91. The semi-continuous reticular  $\beta$ (Mg<sub>17</sub>Al<sub>12</sub>) is gradually becoming the thin strip, and the distribution is more uniform. There are granular Al<sub>3</sub>Nd phase formed. And rare earth Nd significantly improved the resistance corrosion of AZ91 magnesium alloy. The alloy with 1.4% Nd has the best corrosion resistance, and the corrosion rate is 0.1708 mg·cm<sup>-2</sup>·d<sup>-1</sup>, only 20% of that of common AZ91 alloy.

**Keywords:** materials failure and protection magnesium alloy Nd microstructure corrosion resistance

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## 参考文献:

- [1] XU He, LIU Jingan, XIE Shuisheng, Magnesium Alloy Fabrication and Processing Technology 1, (BengJing, Metallurgical Industry Press, 2007) 1

- [2] WANG Jingfeng, QIN Bin, WU Xia, PAN Fusheng, TANG Aitao, Current Status and Development of Research on Anti-corrosion Technology for Magnesium Alloys, *Surface Technology*, 37(5), 71(2008)
- [3] Y L Song, Yao Hui Liu, S R Yu, X Y Zhu, S H Wang, Effect of neodymium on microstructure and corrosion resistance of AZ91 magnesium alloy, *Mater Sci*, 42, 4436 (2007)
- [4] Du Wenbo, Wu Yufeng, Nie Zuoren, Su Xuekuan, ZuoTieyon, Effects of Rare Earth and Alkaline Earth on Magnesium Alloys and their Applications, *Rare Metal Materials and Engineering*, 35(9), 1345(2006)
- [5] LIU Chuming, GEWeiwei<sup>1</sup>, LI Huizhong, CHEN Zhiyong, WANG Rong, GAO Yanrui, Effect of Er on microstructure and corrosion resistance of AZ91 magnesium alloy, *The Chinese Journal of Nonferrous Metals*, 19(5), 848(2009)
- [6] WANG Rongbin, Roles of R in Magnesium Alloys and Application of RE Magnesium, *Nonferrous Metals Processing*, 36(1), 27(2007)
- [7] LIU Shengfa, WANG Huiyuan, KANG Liugen, HUANG Shangyu, XU Ping, Effect of neodymium on as-cast microstructure of AZ91 magnesium alloy, *The Chinese Journal of Nonferrous Metals*, 16(3), 467(2006)
- [8] NIU Gao, ZhaoYuanhua, CHEN Yungui, TANG Yongbai, XIAO Sufen, ZHANG Xiaoping, WEI Shanghai, Effects of Different Nd Content on Microstructure and Mechanical properties of AZ91 Alloy, *Special Casting and Nonferrous Alloys*, 28(9), 717(2008)
- [9] ZHANG Jinghuai, TANG Dingxian, ZHANG Hongjiel, WANG Limin, WANG Jun, MENG Jian, Effect and Application of Rare Earth Element in Magnesium Alloys, *Chinese Journal Of Rare Metals*, 32(5), 659(2008)
- [10] XU Ping, LIU Shengfa, HUANG Shangyu, GUO Honghe, WANG Kaifeng, Influence of Microstructure on the Corrosion of AZ91 Mg Alloy, *China Foundry Machinery and Technology*, 11(2004)
- [11] 徐萍, 刘生发, 黄尚宇, 郭洪河, 王凯峰, AZ9镁合金显微组织对腐蚀性能的影响, *中国铸造装备与技术*, 11(2004)
- [12] YU Fan, Guohua Wu, CHUN quanzhai, Influence of cerium on the microstructure, mechanical properties and corrosion resistance of magnesium alloy, *Materials Science and Engineering*, 33(4), 210(2006)
- [13] YAO Sujuan, LI Wangxing, YANG Sheng, YI Danqing, Effect of Yttrium on Microstructure and Corrosion Properties of AZ91 Alloy, *Journal Of The Chinese Rare Earth Society*, 25(3), 332(2007)
- [14] LI Yonggang, WEI Yinghui, YANG Lijing, HOU Lifeng, Corrosion behavior of single phase Mg<sub>17</sub>Al<sub>12</sub> in sodium chloride solution, *Ordnance Material Science and Engineering*, 33(2), 18(2010)

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1. 赵蕊, 唐聿明, 熊金平, 左禹. 二乙基二硫代氨基甲酸钠和硫脲对AZ91D镁合金在3.5%NaCl溶液中的缓蚀作用[J]. *材料研究学报*, 2011,23(3): 251-255
2. 马宏, 彭晓东, 谢卫东. 稀土Y对镁合金显微组织及腐蚀性能的影响[J]. *材料研究学报*, 2011,23(3): 223-227
3. 张满意, 郭兴伍, 杨海燕, 王渠东, 丁文江. 水热条件下Mg-3Nd-Zn-Zr合金化学转化膜的研究[J]. *材料研究学报*, 2011,23(3): 233-238
4. 吴靓, 董虹星, 贺跃辉. Ni<sub>3</sub>Al金属间化合物多孔材料的制备及抗腐蚀性能[J]. *材料研究学报*, 2011,25(2): 118-123
5. 方信贤, 甄睿, 薛亚军, 王章忠. 两种不锈钢在单相流和液/固两相流中冲刷与腐蚀的交互作用[J]. *材料研究学报*, 2011,25(2): 172-178
6. 李绮, 刘新杰, 王泽庆, 颜廷亭, 谭丽丽, 张炳春, 杨柯. AZ31B镁合金表面氟涂层的生物相容性和抗菌性能[J]. *材料研究学报*, 2011,25(2): 193-198
7. Yasuhiro YAMAZAKI. Evaluation of Interfacial Strength by an Instrumented Indentation Method and

Its Application to an Actual TBC Vane[J]. 材料研究学报, 2011,24(2): 109-117

8. 汪俊英, 孔小东. 两种铝合金在3%NaCl溶液中的腐蚀特性[J]. 材料研究学报, 2011,23(1): 41-44

9. 陈志超, 戈晓岚, 曾兵. AZ91D镁合金Ni-Sn双层镀膜研究[J]. 材料研究学报, 2011,23(1): 75-77

10. 葛延峰 蒋百铃 李育磊 杨志远. 镁合金表面微弧氧化--SiO<sub>2</sub>复合膜层的微观结构和耐蚀性[J]. 材料研究学报, 2011,25(1): 79-83

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