

研究论文

高密度脉冲电流对服役后期高锰钢辙叉组织结构的影响

杨志南, 张明, 张福成, 冯晓勇

燕山大学亚稳材料制备科学与技术国家重点实验室 秦皇岛 066004

摘要: 用高密度脉冲电流对服役后期的高锰钢辙叉进行表面处理, 研究了对其组织结构的影响。结果表明, 在较低的温度下(786 K)辙叉发生再结晶, 再结晶晶粒尺寸约为29.3 μm , 远比处理前的晶粒尺寸小, 处理后的显微硬度显著降低。在高密度脉冲电流作用下, 位错运动能力、原子的扩散能力以及振动频率都提高了, 从而使再结晶的形核速率显著提高, 使辙叉在较低的温度下快速完成再结晶。处理后高锰钢的疲劳寿命显著提高。

关键词: 金属材料 再结晶 脉冲电流 高锰钢辙叉

Effect of High Current Density Electropulsing on the Microstructure of Later-Serviced High Manganese Steel Crossing

YANG Zhinan, ZHANG Ming, ZHANG Fucheng, FENG Xiaoyong

State Key Laboratory of Metastable Materials Science and Technology, Yanshan University, Qinhuangdao 066004

Abstract: A kind of high current density electropulsing treatment was carried out on the surface of later-serviced high manganese steel crossing. The results show that specimen finished recrystallization at a relatively low temperature of 786 K, the recrystallization grain size of 29.3 μm was much finer than that of the specimen before treatment, and the microhardness decreased remarkably after treatment by high current density electropulsing. Electropulsing enhanced the recrystallization nucleation rate of the specimen which resulted in recrystallization being finished at low temperature rapidly. Enhancement of the nucleation rate mainly resulted from the increase in mobility of dislocation diffusion ability of atoms and the frequency of the atoms. The fatigue life of high manganese steel was improved notably after treatment by high current density electropulsing.

Keywords: metallic materials recrystallization electropulsing high manganese steel crossing

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通讯作者: 张福成

作者简介:

通讯作者E-mail: zfc@ysu.edu.cn.

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