

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第9卷 第4期 (总第33期) 1999年12月

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文章编号: 1004-0609(1999)04-0774-05

钽丝的拉拔及退火织构

张新明¹ 张少睿¹ 周卓平¹ 舒永春²

(1. 中南工业大学材料系, 长沙 410083; 2. 宁夏905厂, 石嘴山 753000)

摘要: 对不同拉拔变形程度及不同温度退火后的钽丝织构, 借助极图与现代ODF分析术进行了研究。结果表明钽丝的拉拔织构主要聚集在 α -取向线上, 形成 $\langle 110 \rangle$ 丝织构, 织构组分主要有 $\{441\} \langle 110 \rangle$, $\{332\} \langle 110 \rangle$, $\{334\} \langle 110 \rangle$ 及 $\{115\} \langle 110 \rangle$ 。丝织构的形成与发展的主要特征可用 $\{110\} \langle 111 \rangle$ 位错滑移和轴对称变形的Taylor完全限制模型进行解释。两种不同减面率的钽丝具有明显不同的退火织构组分。77%冷拉减面率的钽丝退火后具有与拉拔丝基本相同的织构组分, 钽丝发生了原位再结晶。90%冷拉减面率的钽丝低温退火后产生同样的效果, 然而经高温退火后出现新的织构组分 $\{111\} \langle 110 \rangle$ 和 $\{111\} \langle 112 \rangle$ 随退火温度的升高而增强, 其形成由定向长大机制控制。

关键字: 钽丝; 拉拔; 退火; 织构; 电容器

Cold drawing and annealing textures of tantalum wires

Zhang Xinming¹, Zhang Shaorui¹, Zhou Zhuoping¹, Shu Yongchun²

(1. Department of Materials Science and Engineering,
Central South University of Technology, Changsha 410083, P. R. China
2. Ningxia 905 Factory, Shizuishan 753000, P.R.China)

Abstract: The cold drawing textures of the tantalum wires for different reductions in area and their recrystallization textures at different temperatures were investigated by pole figures and ODF. It was found that the $\langle 110 \rangle$ fiber texture was mainly gathered on the α -fibre and strengthened with the reduction in area; the texture components consisted of $\{441\} \langle 110 \rangle$, $\{332\} \langle 110 \rangle$, $\{334\} \langle 110 \rangle$ and $\{115\} \langle 110 \rangle$, and the component $\{441\} \langle 110 \rangle$ was the strongest, the $\langle 110 \rangle$ fiber texture can be explained by the $\{110\} \langle 111 \rangle$ dislocation-slip. The corresponding simulation carried by using full constraints Taylor model showed a good result compared with the experimental one. There were two types of the annealing textures in two sizes of wires, the annealing of the drawn wires with 77% area reduction at different temperatures basically generated the same textures as their drawn wires had, the texture can be mainly attributed to continuous recrystallization; the same results were found in the annealed wires with 90% area reduction at low temperature. However, in the annealed wires at high

temperatures, the new texture $\{111\}\langle 110\rangle\text{-}\{111\}\langle 112\rangle$ was found, the formation of new components can be elucidated in terms of discontinuous recrystallization and the oriented growth.

Key words: texture; capacitor; tantalum wire; drawing; annealing

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地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-88876765, 88877197, 88830410 传真： 0731-88877197

电子邮箱： f-ysxb@mail.csu.edu.cn