材料研究学报 >>2010 >>24 >>(5)

材料研究学报 2010, 24(5) 501-507 DOI: ISSN: 1005-3093 CN: 21-1328/TG

研究论文

脉冲周期和糖精添加剂对电沉积Ni镀层微观结构的影响

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摘要： 用脉冲电沉积技术制备Ni镀层, 研究了脉冲周期和糖精添加剂对其微观结构的影响。结果表明, 采用单向脉冲电沉积时, 增大脉冲周期可制备出生长取向更均匀、表面更平整且晶粒尺寸更小的纳米晶Ni镀层; 在镀液中加入糖精可降低镀层中的张应力, 从而避免镀层开裂, 且可明显细化镀层的晶粒尺寸; 采用正反脉冲电沉积时, 随着反向脉冲周期的增大, 镀层的晶粒先沿<200>方向择优生长, 而后转变为沿<111>、<200>和<220>三个方向较均匀生长,最后又重新沿<200>方向择优生长。

关键词： 材料合成与加工工艺 脉冲电沉积 脉冲周期 糖精 织构 微观结构 纳米晶Ni

Effect of Pulse Period and Saccharin Additive on Microstructure of Ni Electrodeposits

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Abstract: The effects of pulse period and saccharin additive on the microstructure of Ni films electrodeposited using pulse power from a conventional nickel sulphate bath have been investigated by SEM, XRD and TEM. The results show that, 1) an increase of pulse period during pulse electrodeposition favors to deposit a finer grained Ni film with increased homogeneity in the deposition orientations along <111>, <200> and <220>; 2) addition of saccharin during the pulse electrodeposition helps to significantly decrease the tensile growth stress, preventing Ni deposits from cracking; 3) an increase of pulse reverse period during pulse reverse electrodeposition causes a gradual evolution in the growth texture of Ni film from first appearance, subsequent disappearance and final appearance of <200> dominant orientation.

Keywords: synthesizing and processing technics pulse electrodepostion pulse period saccharin texture microstructure nanocrystalline Ni

收稿日期 2010-06-17 **修回日期** 2010-08-10 **网络版发布日期** 2010-10-18

DOI:

基金项目:

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