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Al_2O_3弥散粒子对Cu-Al_2O_3合金高温退火显微组织的影响

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摘 要： 利用TEM研究弥散Al_2O_3粒子对变形Cu-Al_2O_3弥散强化铜合金高温退火显微组织的影响。结果表明：弥散强化铜合金等时(1 h)退火时，显微硬度HV呈缓慢下降趋势，没有发生突降现象；弥散铜高温退火主要以位错亚结构回复为主，而亚晶较为少见；粒子弥散参数和胞壁性质对退火时的回复产生非常重要的影响；Al_2O_3弥散粒子影响位错在胞壁内的运动，阻碍胞壁内位错重排、迁移，使得胞壁很难通过运动而获得位向差的积累，从而阻碍大角晶界的形成；随合金中弥散粒子含量的增大和粒子间距的减小，亚晶形核更加困难；Cu-Al_2O_3合金冷轧过程中形成的胞组织的胞壁具有较小的平均位向差，导致弥散铜合金高温退火时难以形成具有明晰边界的亚晶组织。

关键字： Al_2O_3弥散粒子；弥散强化铜；显微组织；退火；回复

Effect of Al_2O_3 disperoid on microstructure of Cu-Al_2O_3 alloy annealed at elevated temperatures

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Abstract: The effect of Al_2O_3 disperoid on the dislocation structure of deformed and annealed Cu-Al_2O_3 alloys at elevated temperature was studied by TEM. The results show that the microhardness (HV) of the Cu-Al_2O_3 alloys decreases slowly with increasing annealing temperature under the condition of the same annealing time (1 h). The annealing microstructure features with a large amount of dislocation cells and few subgrains. The dispersion parameters and the nature of cell wall have a significant effect on the recovery of dislocation cells. The Al_2O_3 particle dispersion can interfere with the movement and

rearrangement of dislocations in the cell walls. The prevention of long range motion of dislocations prohibits the accumulation of misorientation of the cell walls and then inhibits the formation of the high angle boundaries. The formation of subgrains becomes more difficult with the increase of the concentration of Al_2O_3 particle and decrease of the interparticle spacing. The cell walls formed in the as deformed alloys are of small average misorientation. As a result, the formation of well-defined subgrains is difficult during the annealing.

Key words: Al_2O_3 disperoid; dispersion strengthened copper; microstructure; annealing; recovering

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