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时效态Cu-Cr-Zr-Mg-RE合金的组织与性能

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摘要: 采用高分辨电子显微镜(HRTEM)和光学显微镜(OM)研究Cu-0.43%Cr-0.17%Zr-0.05%Mg-0.05%RE(质量分数)合金的微观组织, 测试不同时效工艺下合金的抗拉强度和电导率等性能。结果表明: 合金经过冷轧后, 在 450 °C时效4 h, 析出相细小且弥散分布在基体中, 合金具有较好的综合性能。HRTEM和能谱分析表明, 铬相在合金中有棒状、六边形和球状3种存在形态; 锆主要以富锆相存在于合金基体中; 合金在400 °C时效时, 观察到了亚稳相CrCu₂(Zr, Mg)及其分解过程。

关键字: Cu-Cr-Zr-Mg-RE合金; 微观组织; 电导率; 抗拉强度

Microstructure and properties of aging Cu-Cr-Zr-Mg-RE alloy

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Abstract: The microstructure of Cu-0.43%Cr-0.17%Zr-0.05%Mg-0.05%RE (mass fraction) alloy was studied by high resolution transmission electron microscopy and optical microscopy. The electrical conductivity, tensile strength and micro-hardness of this alloy after cold rolling and aging treatment were investigated. The results show that the alloy aged at 450 °C for 4 h has good combination of physical and mechanical properties. The analyses of HRTEM show that three kinds of chromium-rich phase, such as club-shaped, hexagonal shape and spherical shape exist in the alloy. The zirconium-rich phase and decomposing CrCu₂(Zr, Mg) phase are observed at aging temperature of 400 °C.

Key words: Cu-Cr-Zr-Mg-RE alloy; microstructure; electrical conductivity; tensile strength

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