

### 论文摘要

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## Ni对Mg-Cu-Tb非晶合金形成及力学性能的影响

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**摘要:** 利用熔体铜模喷铸法制备出直径为3 mm的 $Mg_{65}Cu_{25-x}Ni_xTb_{10}$  ( $x=0, 5, 10$ ) 非晶合金。利用X射线衍射、差热分析、压缩实验分析和扫描电镜分析了添加Ni元素对Mg-Cu-Tb非晶合金形成能力及力学性能的影响。研究表明: 随着Ni含量的增加, 合金的玻璃转变温度 $T_g$ 增大; 开始结晶温度 $T_x$ 降低; 过冷液相区宽度 $\Delta T_x$ 减小, 约化玻璃转变温度 $T_{rg}$ 从0.562降至0.530, 非晶形成能力逐渐降低。压缩实验结果表明: 当Ni含量增加到5%时可以明显提高Mg-Cu-Tb-Ni非晶合金的断裂强度。

**关键字:** 镁基非晶合金; 非晶形成能力; 热稳定性; 力学性能

## Effect of substitution of Ni for Cu on glass-forming ability and mechanical properties of Mg-Cu-Tb metallic glass alloys

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**Abstract:** The  $Mg_{65}Cu_{25-x}Ni_xTb_{10}$  ( $x=0, 5, 10$ ) bulk amorphous alloy rods with 3 mm diameters were prepared by copper mold casting technique, and the effect of Ni addition on the glass forming ability (GFA) and mechanical properties of  $Mg_{65}Cu_{25-x}Ni_xTb_{10}$  ( $x=0, 5, 10$ ) alloys were studied by X-ray diffractometry (XRD), differential scanning calorimeter (DSC), compression tests and scanning electron microscopy (SEM). The results show that the glass transition temperature ( $T_g$ ) of the  $Mg_{65}Cu_{25-x}Ni_xTb_{10}$  alloys increases slightly whereas the onset temperature of crystallization ( $T_x$ ), decreases slightly with the increase of Ni content, which results in the decrease of the supercooled liquid region and the glass forming ability. However, an appropriate substitution of Cu by Ni(5%, mole fraction) in  $Mg_{65}Cu_{25}Tb_{10}$  significantly improves the mechanical properties.

**Key words:** Mg-based metallic glasses; glass-forming ability; thermal stability; mechanical properties

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