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Nd对块体Mg-Cu-Y-Nd非晶合金玻璃形成能力的影响

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摘要:在非真空熔炼条件下采用工业纯原材料和负压铜模吸铸法制备 $Mg_{65}Cu_{25}Y_{10-x}Nd_x$ ($x=0, 2, 4, 6, 8, 10$)棒状试样, 利用差示扫描量热(DSC)和X射线衍射(XRD)等方法分析Nd对Mg-Cu-Y-Nd非晶合金玻璃形成能力的影响。结果表明: Nd的含量(x)为0, 4, 6成分的合金试样具有完全非晶态组织, 且 $x=4$ 时具有最大的玻璃形成能力, 其约化玻璃转变温度(T_{rg})为0.592, 过冷液相区宽度(ΔT_x)高达66 K; 当 x 为2, 8, 10时, 由于合金成分明显偏离共晶成分, 玻璃形成能力降低, 试样只含有少量非晶, 且主要呈晶体组织特征。

关键字: 非晶合金; 镁合金; 块体金属玻璃; 玻璃形成能力

Effect of Nd on glass forming ability of bulk amorphous Mg-Cu-Y-Nd alloys

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Abstract: The shape samples of $Mg_{65}Cu_{25}Y_{10-x}Nd_x$ ($x=0, 2, 4, 6, 8, 10$) were made by copper mold suction casting with commercial raw material under condition of no vacuum melting. By differential scanning calorimetry (DSC) and X-ray diffractometry, the effect of Nd on glass forming ability of Mg-Cu-Y-Nd was analyzed. The results show that the samples with x of 0, 4 and 6 are bulk metallic glass, and the best glass forming ability (GFA) appears at $x=4$, while the reduced glass transition temperature T_{rg} is 0.592 and the supercooled liquid region ΔT_x is 66 K. However, samples with x of 2, 8, 10 obviously deviate from eutectic points, their glass forming ability decrease and the samples mainly consist of crystalline and a few non-crystals.

Key words: amorphous alloy; Mg-based alloy; bulk metallic glass; glass forming ability

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