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锡对烧结钕铁硼合金热处理行为的影响

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摘要: 研究了Sn, Al, Dy等元素对烧结钕铁硼合金热处理行为的影响。发现Dy和Al的影响很小, 含Dy和Al的钕铁硼合金, 其热处理行为与三元钕铁硼类似; 而Sn对该合金的热处理行为有重大影响。添加少量Sn(约0.1%)就能使合金热处理温度范围变宽, 且获得最佳性能的热处理温度移向高温。但是含Sn合金在525~625 °C回火, 矫顽力反而比回火前低。X射线衍射发现, 这样的合金有明显的 α -Fe衍射峰出现。实验表明, 仅用晶粒表面光滑化不足以解释合金的热处理行为, 还应考虑亚稳相转变对热处理行为的影响。在优化热处理工艺条件下, 制得 $(BH)_{\max}=223.7$ kJ/m³, $H_{ci}>2.11$ MA/m的Nd₂₇Dy₆Fe_{65.35}Al_{0.4}B_{1.1}Sn_{0.15}合金。

关键字: 锡; NdFeB磁体; 热处理

Effect of added Sn on heat treatment of NdFeB magnets

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Abstract: Effects of Sn, Dy and Al on annealing of NdFeB alloys were investigated. It is found that anneal temperatures are not sensitive to doping Dy or Al. However, Sn influences the annealing of alloys intensely. The temperature range of annealing is broadened by m, inor amount of Sn(about 0.1%), and the best annealing is moved to higher temperature. In addition, after annealing at 520~625 °C, coercivities of alloys doped with Sn are lowered. When alloy is checked by X-ray diffraction, there is α -Fe peak for the alloy degraded coercivity. It is showed by experiment that the smoothing of grain surface is not enough to explain the performance of annealing. The transformation of additional ferromagnetic phases must be responsible

for it, too. After optimizing processing, $\text{Nd}_{27}\text{Dy}_6\text{Fe}_{65.35}\text{Al}_{0.4}\text{B}_{1.1}\text{Sn}_{0.15}$ magnet gains excellent properties, $(BH)_{\max}=223.7\text{kJ/m}^3$, and $H_{\text{ci}}> 2.11\text{ MA/m}$.

Key words: tin; NdFeB magnet; heat treatment

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