硼对 Mm(Ni,Co,Mn,Al)$_5$ 贮氢合金性能的影响

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摘要：在低钴 AB_5 型贮氢合金 $MmNi_{3.8}Co_{0.4}Mn_{0.6}Al_{0.2}$ 中加入微量硼，用铸造和快淬工艺制备了 $MmNi_{3.8}Co_{0.4}Mn_{0.6}Al_{0.2}B_x$（$x$=0, 0.1,0.2,0.3, 0.4）贮氢合金；测试了合金的电化学性能；研究了硼含量对合金初始活化及高倍率放电性能的影响。结果表明：微量硼使合金性能大幅度提高。当 x 从 0 增加到 0.4 时，合金经过 1~5 次循环就可完全活化，铸态合金的 1 C 倍率放电能力从 89.02%增加到 93.61%，38 m/s 快淬态合金的 1 C 倍率放电能力从 79.62%提高到 89.82%。

关键词：低钴 AB_5 型贮氢合金；活化性能；硼含量

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Effect of boron on the performance of Mm(Ni,Co,Mn,Al)$_5$ hydrogen storage alloys

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Abstract：Hydrogen storage alloys $MmNi_{3.8}Co_{0.4}Mn_{0.6}Al_{0.2}B_x$（$x$=0, 0.1,0.2,0.3, 0.4） were prepared by addition of boron in low-Co AB_5 type $MmNi_{3.8}Co_{0.4}Mn_{0.6}Al_{0.2}$ hydrogen storage alloy and cast and rapid quenching. The electrochemical performance of the alloys was measured. The effects of boron on the activation performance and high rate discharge capability of the alloys were investigated. The results showed that the performance of the alloys could be enhanced significantly by the addition of a trace of boron. When x was increased from 0 to 0.4, the alloys could be fully activated through 1~5 charge-discharge cycles and the 1 C rate discharge capability of as-cast alloys was increased from 89.02% to 93.61% and from 79.62% to 89.82% for as-quenched alloys obtained with a quenching rate of 38 m/s.

Key words：low-Co AB_5 type hydrogen storage alloy；activation performance；boron content