Electrochemical Characteristics of Mg-based Alloy Prepared by HT and MG for Nickel-Metal Hydride Secondary Batteries

- C. Wonsub (Pusan National University), N. Byungwook (Pusan National University), and K. Ingon (Dongeui University)

1.Introduction

Mg-based alloys are known to have much higher absorbability(theoretical capacities are 999mAh/g) than commercial hydrogen storage alloys such as AB5 and AB2 types. Besides, their natural resources and cost are rich enough and cheap. However, those Mg-based alloys need to be operated at high temperature and atmospheric pressure(250¡É, 15bar) because of their lower hydrogen equilibrium pressure and poor surface activity. There are a lot of studies for these alloys to settle the problems for example MG (mechanical grinding), MA(mechanical alloying), Surface improvement and coating of electrodes and partial substitution, etc. In this work, Mg2Ni electrode was prepared under rapid cooling condition, as a new electrode making technique. And, Praseodymium was added to the electrode in order to improve the cycle life.

2.Experiment

The material used in this study was Mg2Ni power(below 16mesh) purchased from Japan Metal & Chemical Co. Ltd. in Japan. and put into the tube(2g) made of stainless steel. They are heated to 880¡É and cooled rapidly into water(14¡É). The specimen(1g) was picked from the tube and ball milled with 100wt% Ni for 1, 4, 8, 10, 12, 24 hours. And Pr(0.2, 0.5, 0.7, 1.0 wt%) was added to the specimen before ball milling and then PCT test, charge/dischage test and high-rate dischargeability test were operated with Maccor 4000(battery test system)

3.Result

The discharge capacity for rapid cooled electrode was increased with ball milling time but opposite situation was showed above 12 hours, so the maximum discharge capacities appeared at ball milling time of 12 hours. It was also observed that the addition of Pr was effective in improving the cycle life and the best quantity of Pr was 0.7wt%.

4. Reference

1. J.J. Reilly, R.H. Wiswall Jr., Inorg. Chem.7 (1968)2254.
2. D. Noreus, K. Jansson, M. Nygren, Z. Phys. Chem. 146 (1985) 191.
3. J. Genossar, P.S. Rudman, J. Phys. Chem. Solids 42 (1981) 611.
4. Z. Gavra, M.H. Minz, G. Kimmel, Z. Hadari, Inorg. Chem. 18 (1979) 3595.
5. G.G Libowitz, Electrochemical Society Proceedings Vol.92-5, 1992.