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Hydrogen Storage Alloys with RE–Mg–Ni Based Negative Electrodes. Edited by Shumin Han, Yuan Li and Baozhong Liu. De Gruyter, 2017. Hardcover, Pp. X+234. Price EUR 119.95, USD 137.99, GBP 108.99. ISBN 978-3-11-050116-2.

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This book contains five chapters about rare earth (RE)–Mg–Ni-based alloys which have in recent years started to be used in nickel metal hydride (Ni–MH) batteries. Previously, AB_5-type alloys based on the $LaNi_5$-type structure were used for long time in the Ni–MH batteries. A is a more electro-positive metal, known to form stable hydrides, whereas B is a metal more reluctant to form a hydride. The book has, therefore, a significant importance for those who are following the development of Ni–MH batteries. We could call them hydride batteries to be in better analogy to Li-batteries. The structure of the RE–Mg–Ni-based alloys presented in this book can be considered as layers of AB_2 and AB_5 structures stacked on top of each other in slightly different variations.

Unfortunately, the authors of the different chapters have obviously not been communicating with each other. Therefore, there is much overlap in the content in each chapter. The chapters are better described as individual articles that has been collected within one book. The term for exchange current is, for example, carefully defined in four places in the book on pages 46, 85, 119 and 202. The same happens for the connection between current density and diffusion constant on pages 46, 86 and 119. A similar treatment is also made when the authors define the high rate dischargeability. Even more disturbing is that the stoichiometry of the alloys is described differently in the different chapters, as either different ratios between the layers or more conventionally with chemical formulas. This makes it not so straightforward to compare the results presented in each chapter. Cycle life is given for the alloys, but no information upon how the cycling has been performed, making it difficult to compare the cycle lifes to other sources in the literature. Half-cell data are valuable but different from full-cell data. Hydride batteries are usually nickel electrode limited with a nickel electrode capacity that is around 30 to 50% lower than the MH-electrode capacity. This means that the MH electrode is not as deeply cycled as in half-cell tests. On the other hand, the alloy is exposed to oxygen gas at the end of each charging cycle, when the cell is moving into the overcharging regime.

This book does, however, contain a large amount of valuable information.