Electrodeposition of Sm-Co Alloy Films with Nanocrystalline/Amorphous Structures from a Sulphamate Aqueous Solution

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doi: 10.20964/2017.12.07

Received: 15 July 2017 / Accepted: 22 September 2017 / Published: 12 November 2017

Sm-Co alloys as permanent magnetic materials have attracted considerable interest for their application in the miniaturization of electronic devices. However, a facile method for depositing Sm-Co alloy films is still urgently needed. In this work, we exploited a simple aqueous electrodeposition approach to prepare Sm-Co films. Electrodeposition was realized by galvanostatic electrolysis from a stable sulfamate aqueous solution. The influence of the applied current density on the composition, morphology, structure and magnetic properties of the Sm-Co films was studied. Samarium was successfully incorporated into the films by the induced effect of Co(II) ions. Manipulating the current density varied the samarium content from 5.8 to 25.3 at%. Sm-Co nanosheets were discovered and were determined to have a mixed nanocrystalline/amorphous character. Furthermore, the electrodeposited Sm-Co films exhibited an obviously enhanced coercivity compared with that of other reported films.

Keywords: Sm-Co films; Electrodeposition; Aqueous solution; Nanosheets; Nanocrystalline/amorphous

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