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Abstract
In this study, the Ni nanowire arrays is prepared by using the arrays nanoporous of anodic aluminum oxide membrane as a template (AAO template) with electrodeposition method. The Ni and Ni-Co nanowire arrays were deposited with various electrolytic condition. The optimum electrolytic conditions had been investigated. The diameter of AAO pores is about 250nm. Furthermore, the growing phenomenon, microcrystalline structure and magnetic properties were investigated in the presence of ultrasonic irradiation with a various irradiation power density.
The deposition rates was increased with the increasing of the electrolytic potential without ultrasonic irradiation. Ni nanowires almost not be obtained as the electrolytic potential less then -0.8V. The Ni nanowires were deposited successfully in the electrolytic potential range of -0.8V to -1.0V. On the other hand, the Ni nanowires were not grown uniformly as the electrolytic potential above -1.1V. Therefore, the optimum electrolytic potential was determined of -1.0V. On the other hand, the rates of Ni nanowires deposition increased with increasing of the ultrasonic irradiation power density in the presence of ultrasonic irradiation.
When the microstructure had not change significantly under 12W of ultrasonic irradiation power density compared with the absence of ultrasonic irradiation. When ultrasonic irradiation power densities were above 15W, the preferred growth orientations of Ni nanowires was (111) plane, and the (111) plane was the maximum when power density of ultrasonic irradiation was 18W.
The analysis of growth rate, crystallinity and magnetic properties of Ni-Co nanowires increased with ultrasonic irradiation compared with without ultrasonic irradiation, because of the strong agitation effect was generated during ultrasonic irradiation.
XRD pattern shown the Co-Ni alloy nanowire deposited that the crystal structure was fcc mixes hcp structure in the absence of ultrasonic. The (111) plane was improved with the ultrasonic irradiation and the Ni content of Ni-Co nanowires deposited. Furthermore, the crystallinity of the Ni-Co nanowires deposited increased with two effects. On the other hand, in the presence of ultrasonic irradiation the referred growth orientations of fcc (111) plane was inhibited and improved the hcp (100) growth, because the shock wave effects generated during ultrasonic irradiation.
The magnetic properties of Ni-Co alloy nanowire arrays were determined by VSM with a function of Ni-Co composition, even use ultrasonic or not. The magnetic easy axis of the Ni-Co alloy nanowire was perpendicular the nanowire, and with ultrasonic irradiation(18W) that the crystallinity was better

then without ultrasonic irradiation. Because the shock wave effect of ultrasonic irradiation improved the (111) perfect orientation plane, and make magnetic properties became more better. The magneticcrystalline aniosotrppy affected on the alloy Ni-Co nanowire deposited become hard magnetic, and in the same time we can find the pure Ni and pure Co are all soft magnetic, It was indicated that you can discretionarily fabricated different content magnetic nanowire all you need .
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