

BP08

Evaluation of LDPC and SCCC on the PMR Channel Model

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LDPC (Low-density parity-check) code and Turbo code show good performance in many communication systems. Recently they are applied in storage systems for improving the bit error rate (BER) performance [1]. Serial concatenated convolutional code (SCCC) using recursive systematic convolutional (RSC) code has simpler scheme than iterative coding schemes like LDPC or Turbo codes [2]. We know that the LDPC code has better BER performance than RSC code but LDPC code has very higher hardware complexity than RSC code. We investigate the performance of these systems after four channel iterations. In Fig.1, we notice that the SCCC has better performance than the LDPC system until 27dB ($< 10^{-6}$ BER). On the other hand ($> 10^{-6}$ BER), the LDPC code has better performance than the SCCC. We see the error floor of SCCC after 10^{-6} BER. The SCCC and LDPC perform 3.5dB better than the NPML at 10^{-6} BER. In LDPC, the maximum number of inner iterations and channel iterations are 10 and 4, respectively. In SCCC, the number of channel iterations is 4, too. The normalized user bit density (UBD) is 1.7. The code rate is 0.944(4096/4336). We use the PR target of PR(12321). The percentage of the jitter noise is 80% and AWGN is 20%.

We can expect that the performance is improved if we increase the number of iterations in both systems. Therefore we simulate the performance when inner iterations of LDPC decoder and channel iterations are increased.

We conclude that the SCCC is better coding scheme than LDPC because the RSC encoder/decoder is simple. Also the error floor may not cause any problem since the system has to use the outer code (In general, RS code is used for the outer code.) for error free system.

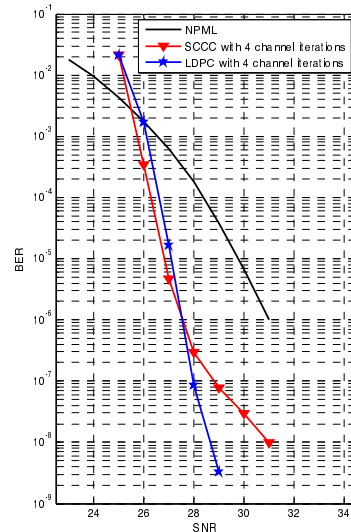


Fig. 1. Result of the comparison LDPC and SCCC.

REFERENCES

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BP09

Structural and Magnetic Properties of Electrodeposited Co-W Films

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Perpendicular magnetic recording (PMR) has been developed as a high density recording technique[1]. Co-W alloy films attracted great research interests due to their favorable magnetic properties for PMR, as well as a good wear resistance which is a major problem in magnetic recording media. These alloys also possess a high Curie point and perform endurance to hostile environments or extreme vacuum condition which is the feature of space environment[2,3]. Although preparation of electrodeposited Co-W were well studied[1-3], the information of correlation of structural and magnetic properties for magnetic anisotropic films is still lack. In this study, the effects of composition, thickness and annealing on the morphology and magnetic properties of electrodeposited Co-W films for perpendicular magnetic recording were studied.

Co-W alloy films with different thickness were deposited on pre-polished Cu substrates by electro-chemical method at different current densities from a novel bath containing some organic additives. The solution temperature was kept constant at 50°C. The bath was well-stirred by nitrogen gas flow during deposition. After deposition the samples were annealed in a vacuum condition better than 1×10^{-6} Torr at different temperatures. The morphology and composition of the films were examined with a scanning electron microscopy (SEM) and energy-dispersive X-ray analyzer (EDS), respectively. The crystalline structure was investigated by X-ray diffraction (XRD) with CuK α radiation. The magnetic properties were studied by a vibrating sample magnetometer (VSM).

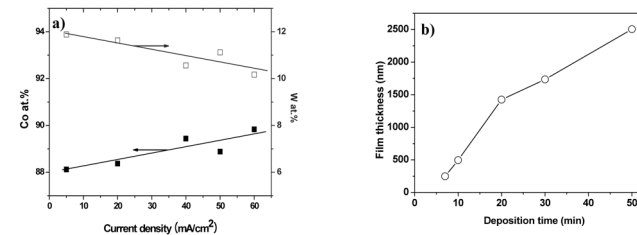


Fig. 1. a) Composition of electrodeposited Co-W films as a function of current density (deposition time: 20 min); b) Film thickness as a function of deposition time (deposition current density: 5 mA/cm²).

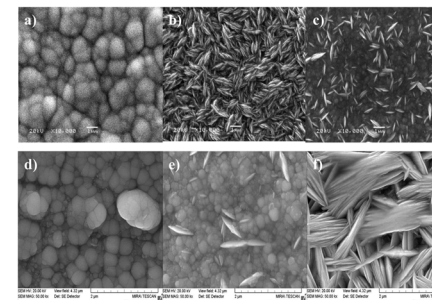


Fig. 2. SEM image of Co-W films electrodeposited at a) 110 mA/cm², b) 60 mA/cm² and c) 5 mA/cm²; FESEM image of Co-W films electrodeposited at 5 mA/cm² for d) 5 min, e) 20 min and f) 50min.