研 究 論 文

超常磁性Co基グラニュラー薄膜の磁気特性の成膜速度依存性と新規反応性パルスDCスパッタリング成膜法の有用性の検討

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Dependence of magnetic properties in superparamagnetic Co-granular thin films on deposition rate and effectiveness of a new pulsed DC reactive sputtering method for film fabrication with high deposition rate.

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The superparamagnetic thin films with a granular structure show a characteristic magnetization curve. In this study, Co-Al_2O_3 granular thin films were fabricated by the sputtering method with normal DC source for Co deposition, RF source for Al_2O_3 deposition, and pulsed DC reactive sputtering were used for fabrication of non-magnetic matrix of oxide or nitride of Al or Si. As a result, Co-Al_2O_3 superparamagnetic thin films with high magnetization could be obtained with high deposition rate. Very high deposition rate was obtained for fabrication of oxide or nitride films of Al or Si using the pulsed DC reactive sputtering method. This deposition rate was 5 times larger than RF sputtering method. It is expected that a sputtering method with DC source for Co deposition and pulsed DC source for matrix deposition will be effective to realize very high magnetization in the superparamagnetic granular thin films.

Keywords : Superparamagnetic thin films, Pulsed DC reactive sputtering, Granular structure, Matrix material, High magnetization.