

## A Study on Fabrication of Magnetic Thin Film Inductors for DC-DC Converter

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In this study, the optimum structure of a magnetic thin film inductor was designed for application of DC-DC converters. The Ni<sub>81</sub>Fe<sub>19</sub> (at%) alloy was selected as a high-frequency ( $\geq$  MHz) magnetic thin film core material and deposited on various substrates (bare Si, SiO<sub>2</sub> coated Si) using a high vacuum RF magnetron sputtering system. As-deposited NiFe thin films show similar magnetic properties compared to bulk NiFe alloys, indicating that they have a good film quality. The optimum design of solenoid-type magnetic thin film inductors was performed utilizing a Maxwell computer simulator (Ansoft HFSS V7.0 for PC) and parameters obtained from the magnetic properties of magnetic core materials selected. The high-frequency characteristics of the inductance(L) and quality factor(Q) obtained for the designed inductors through simulation agreed well with those obtained by theoretical calculations, confirming that the simulated result is realistic. The optimum structure of high-performance ( $Q \geq 60$ ,  $L = 1\mu\text{H}$ , efficiency  $\geq 90\%$ ), high-frequency ( $\geq 5\text{MHz}$ ), and solenoid-type magnetic thin film inductors was designed successfully.