## Room-temperature Preparation of Al<sub>2</sub>O<sub>3</sub> Thick Film by Aerosol Deposition and Simulation of 10 GHz-LC Filter for Integrated RF Module

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Active and passive electronic components have been required to be miniaturized and operated at high frequencies for mobile and microwave devices. For the further down-sizing of them with high functions, it is indispensable to integrate both active and passive devices simultaneously in the form of 3-dimensional multilayer-structured modules. In this study, Aerosol Deposition Method(ADM) will be proposed as a new technology of promise for the integrated RF modules. Al<sub>2</sub>O<sub>3</sub> thick films were deposited on glass or Al substrates at room temperature using  $0.4\,\mu\text{m}$ -diameter  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> powders by ADM.  $10\,\mu\text{m}$ -thick nanocry stalline  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> films with good transparency could be obtained with the rate of about  $1.7\,\mu\text{m}$ -min without any heat treatments. Relative dielectric permittivity and loss tangent of the Al<sub>2</sub>O<sub>3</sub> thick films on Al showed  $9.5\,\mu\text{m}$  and  $0.005\,\mu\text{m}$  as good as the values of bulk ceramics, respectively. For a transmission line with  $50\,\Omega$ -characteristic impedance, the patterning process with  $11\,\mu\text{m}$ -line width was performed by the lift-off method using electron-beam lithography and Pt sputtering. On the patterned Pt/Al<sub>2</sub>O<sub>3</sub>/Al substrates, Cu-metal transmission lines with  $5\,\mu\text{m}$ -thick and sharp edges were successfully formed by electroplating. Low-pass filters with  $10\,\mu\text{GHz}$  cut-off frequency were simulated by an electromagnetic analysis software (Sonnet Suite 8.0) so that it exhibited the validity of ADM as a co-integration technology for integrated RF modules.

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## 니켈전극을 이용한 탄화규소 쇼트키 다이오드 제작 및 수소 플라즈마 처리 효과에 관한 연구

Fabrication of the Ni/SiC Schottky Barrier Diode
-The Effect of Post H<sub>2</sub> Plasma Treatment

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탄화규소 (SiC)는 고온에서의 우수한 안정성과 광역 에너지 금지대역 (2  $3\sim3$  2 eV), 높은 파괴전압 ( $5\times10^6$  Vcm<sup>-1</sup>), 큰 포화이동속도 ( $2.5\times10^7$  cms<sup>-1</sup>)등의 우수한 전기적 특성으로 인하여 고온, 고출력, 고주파 영역에서 작동되는 소자의 재료로서 많은 연구가 진행되어 왔다.

제작된 Schottky Barrier Diode는 4H-SiC 기판을 사용하였으며 쇼트키 접촉을 위해 Ni이증착 되었다고전압 인가 시에 egde 부분에 field가 crowding 되는 현상을 억제하기 위해 metal-oxide overlap structure 형태로 제작 하였다

본 연구에서는 제작된 다이오드를 통해 dot 크기 또는 Pad 크기 등의 구조 변화가 소자에 미치는 영향 및 후 수소 플라즈마 처리를 통한 효과 등을 관찰하였다

소자의 특성분석은 I-V, C-V, DLTS를 이용하여 분석하였으며 후 수소 플라즈마 처리로 인하여 leakage current와 ron이 감소함을 확인 할 수 있었다.