

임베디드 커패시터의 응용을 위해 CCL 기판 위에 평가된 BMN 박막의 특성

김혜원*, 안준구*, 안경찬*, 윤순길*

*충남대학교 나노시스템공학과

The Properties of $\text{Bi}_2\text{Mg}_{2/3}\text{Nb}_{4/3}\text{O}_7$ Thin Films Deposited on Copper Clad Laminates For Embedded Capacitor

Hae-won Kim*, Jun-Ku Ahn*, Kyeong-Chan Ahn* and Soon-Gil Yoon*

*Department of Nano Information Systems Engineering, Chungnam National University, Daeduk Science Town, 305-764, Daejeon, Korea.

Abstract

Capacitors among the embedded passive components are most widely studied because they are the major components in terms of size and number and hard to embed compared with resistors and inductors due to the more complicated structure. To fabricate a capacitor-embedded PCB for in-line process, it is essential to adopt a low temperature process (<200°C). However, high dielectric materials such as ferroelectrics show a low permittivity and a high dielectric loss when they are processed at low temperatures. To solve these contradicting problems, we studied BMN materials as a candidate for dielectric capacitors processed at PCB-compatible temperatures.

The morphologies of BMN thin films were investigated by AFM and SEM equipment. The electric properties (C-F, I-V) of Pt/BMN/Cu/polymer were evaluated using an impedance analysis (HP 4194A) and semiconductor parameter analyzer (HP4156A).

$\text{Bi}_2\text{Mg}_{2/3}\text{Nb}_{4/3}\text{O}_7$ (BMN) thin films deposited on copper clad laminate substrates by sputtering system as a function of Ar/O_2 flow rate at room temperature showed smooth surface morphologies having root mean square roughness of approximately 5.0 nm. 200-nm-thick films deposited at RT exhibit a dielectric constant of 40, a capacitance density of approximately 150 nF/cm², and breakdown voltage above 6 V. The crystallinity of the BMN thin films was studied by TEM and XRD.

BMN thin film capacitors are expected to be promising candidates as embedded capacitors for printed circuit board (PCB).

Keywords : $\text{Bi}_2\text{Mg}_{2/3}\text{Nb}_{4/3}\text{O}_7$ Thin Films, Embedded capacitor, Dielectrics, CCL(Copper Clad Laminates)