

## MOCVD를 이용한 BiSbTe<sub>3</sub> 박막성장 및 열전소자 제작

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**Abstract :** Bismuth-antimony-telluride based thermoelectric thin film materials were prepared by metal organic vapor phase deposition using trimethylbismuth, triethylantimony and diisopropyltelluride as metal organic sources. A planar type thermoelectric device has been fabricated using p-type Bi<sub>0.4</sub>Sb<sub>1.6</sub>Te<sub>3</sub> and n-type Bi<sub>2</sub>Te<sub>3</sub> thin films. Firstly, the p-type thermoelectric element was patterned after growth of 4 $\mu$ m thickness of Bi<sub>0.4</sub>Sb<sub>1.6</sub>Te<sub>3</sub> layer. Again n-type Bi<sub>2</sub>Te<sub>3</sub> film was grown onto the patterned p-type thermoelectric film and n-type strips are formed by using selective chemical etchant for Bi<sub>2</sub>Te<sub>3</sub>. The top electrical connector was formed by thermally deposited metal film. The generator consists of 20 pairs of p- and n-type legs. We demonstrate complex structures of different conduction types of thermoelectric element on same substrate by two separate runs of MOCVD with etch-stop layer and selective etchant for n-type thermoelectric material. Device performance was evaluated on a number of thermoelectric devices. To demonstrate power generation, one side of the device was heated by heating block and the voltage output was measured. The highest estimated power of 1.3mW is obtained at the temperature difference of 45K. We provide a promising approach for fabricating thin film thermoelectric generators by using MOCVD grown thermoelectric materials which can employ nanostructures for high thermoelectric properties.

**Key Words:** Thin film; Thermoelectric; MOCVD; Bismuth-antimony-telluride