Design, fabrication and characteristics of 3C-SiC micro heaters for high temperature, high powers
Jae-Min Jeong, Gwiy-Sang Chung
School of Electrical Eng., Univ. of Ulsan

Abstract: This paper describes the characteristics of a poly 3C-SiC micro heater which was fabricated on AlN(0.1 μm)/3C-SiC(1.0 μm) suspended membranes by surface micro-machining technology. The 3C-SiC and AlN thin films which have wide energy band gap and very low lattice mismatch were used sensors for high temperature and voltage environments. The 3C-SiC thin film was used as micro heaters and temperature sensor materials simultaneously. The implemented 3C-SiC RTD (resistance of temperature detector) and the power consumption of micro heaters were measured and calculated. The TCR (thermal coefficient of the resistance) of 3C-SiC RTD is about -5200 ppm/°C within a temperature range from 25°C to 50°C and -1040 ppm/°C at 500°C. The micro heater generates the heat about 500°C at 10.3 mW. Moreover, durability of 3C-SiC micro heaters in high voltages is better than Pt micro heaters. A thermal distribution measured and simulated by IR thermovision and COMSOL is uniform on the membrane surface.

Key Words: Poly 3C-SiC, AlN, micro heater, RTD, TCR