Thermo-Electro-Mechanical Analysis of Low Cost Microheater using Nickel Alloy

Sunipa Roy
Guru Nanak Institute of Technology, Kolkata, India.

Low power consumption is a very crucial characteristic of a microheater for the gas sensor platform. In this paper, we present a complete electrothermal analysis of a microheater for MEMS based gas sensor using a low cost nickel alloy INVAR (alloy of Ni, Co, Fe) having high resistivity 43e-8 Ωm and high yield stress ~405 MPa with low thermal conductivity ~12 W/m/□C. A comparative study has also been made with six different heater structures. Thermal electrical analysis was done using finite element modelling of Intellisuite 8.2.2. The maximum temperature of ~112ºC with a distribution of ± (2-3) % over the entire microheater membrane region has been achieved with 4V excitation. The power consumption (~120 mW) has been achieved.

Biography:

Sunipa Roy (Senior Member, IEEE) received the Ph.D. degree from the Department of Electronics and Telecommunication Engineering, Jadavpur University, in 2014. She is serving as the Head of the Department of Electronics and Communication Engineering, Guru Nanak Institute of Technology. She is also with IC Design and Fabrication Center, Department of ETCE, Jadavpur University.