Determination of Electrical Properties of n-Type and p-Type Polycrystalline Silicon Thin Films as Sensor Materials

Hideo Muro*, Takeshi Mitamura1 and Shigeyuki Kiyota2

Department of Electrical, Electronics and Computer Engineering, Chiba Institute of Technology,
2-17-1 Tsudanuma, Narashino, Chiba 275-0016, Japan
1Nissan Research Center, Nissan Motor Co., Ltd., 1 Natsushima-cho, Yokosuka, Kanagawa 237-8523, Japan
2Powertrain Engineering Division, Nissan Motor Co., Ltd., 1-1 Morinosatoaoyama, Atsugi, Kanagawa 243-0123, Japan

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The electrical properties of both n-type and p-type polycrystalline silicon (polysilicon) films for sensor applications have been characterized, together with the basic electrical characteristics of these films. For n-type and p-type polysilicon piezoresistors, the measured longitudinal gauge factors are −15 to −24 and 24 to 31, respectively, whereas the transverse gauge factors are much smaller. The temperature coefficients of resistance are between −1000 and −2000 ppm/K for both n-type and p-type polysilicons. A full-bridge configuration for stress sensors using both n-type and p-type polysilicon piezoresistors is proposed. The measured Seebeck coefficients for n-type and p-type polysilicon films are −0.21 to −0.43 mV/K and 0.21 to 0.28 mV/K, respectively.

*Corresponding author, e-mail address: hideo.muro@it-chiba.ac.jp