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

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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.

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