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Fabrication of High-Temperature Silicon Pressure Sensor Using SDB-SOI Technology

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A high-temperature pressure sensor using SOI structures formed by silicon-direct-bonding (SDB) technology has been developed. This sensor consists of a thin square diaphragm and a single-element four-terminal piezoresistor produced by MEMS technology by a standard IC process. The diaphragm sizes are 700×700×40 μm^3 (D700), 1700×1700×40 μm^3 (D1700), 2200×2200×40 μm^3 (D2200) and the thickness of the diaphragm is 40 μm. The pressure sensitivity of the fabricated sensor was 16.6 μV/V·kPa (D700), 95.6 μV/V·kPa (D1700) and 183.6 μV/V·kPa (D2200) for the 100 kPa full-scale pressure range. A sensitivity shift of less than 0.097%FS/°C was obtained in the temperature range between +20°C and +370°C.

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