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THICK FILM PIEZORESISTOR SENSING STRUCTURE5 ABSTRACT

A thick-film strain-sensing structure (10) for a media-compatible, high-pressure sensor. The strain-sensing structure generally includes a metal diaphragm (12), at least one electrical-insulating layer (14) on the diaphragm (12), an interface layer (16) on the electrical-insulating layer (14), and at least one thick-film piezoresistor (18) on the interface layer (16) for sensing deflection of the diaphragm (12). The interface layer (16) and the electrical-insulating layers (14) are preferably formed by thick-film processing, as done for the piezoresistors. For compatibility with the metal diaphragm (12), the electrical-insulating layer (14) has a CTE near that of the diaphragm (12). The interface layer (16) is formulated to inhibit and control diffusion of the electrical-insulating layers (14) into the piezoresistors (18). For this purpose, the interface layer (16) is formed from a composition that contains, in addition to a suitable organic media, alumina, zinc oxide, and at least one glass frit mixture comprising lead oxide, a source of boron oxide such as boric acid, silica and alumina. Additional constituents of the interface layer (16) preferably include titania, cupric oxide, manganese carbonate as a source for manganese monoxide, and cobalt carbonate as a source of cobalt oxide.

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