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An enhanced sensitivity miniature pressure sensor for medical purposes

I V Godovitsyn

SMC Technological Center, Russia

The in-situ measurements of blood pressure are an important part of modern hospital routine. For example, a blood vessel stricture can only be effectively treated using operational approach when local coronary pressure is continuously monitored. To obtain necessary information, a flexible rubber catheter with a tiny pressure measuring device at the tip of the catheter is commonly used. Silicon pressure sensors are the best candidate to be embedded in catheters for their small dimensions, high electrical performance and low production cost. Among silicon pressure sensors the miniature ones are more attractive for size demanding applications for their inherent capability for reduction of overall dimensions, the typical dimensions of sensing element are 100-150 μm . However, miniature pressure sensors suffer from low sensitivity resulting from using of low gauge factor polysilicon layer as a material for piezoresistors. Here a new miniature piezoresistive pressure sensor is presented that has both small dimensions and high sensitivity. High sensitivity of the proposed sensor comes from the use of monocrystalline silicon for piezoresistors as it is done in traditional bulk-micromachined sensors. Piezoresistors are formed from device layer of SOI wafer that serves as starting material for the sensor. A ring membrane is formed from 1.2 μm thick deposited polysilicon layer and has outer radius of 80 μm thus yielding chip dimensions in sub-mm range. The sensor has sensitivity about 24 mV/(V.atm) that is in the same range with sensitivity of traditional bulk-micromachined pressure sensors.

Biography

I V Godovitsyn has completed his PhD degree in 1997 from the National Research University of Electronic Technology, Moscow, Russia. He is currently with SRC "Technological Center", Moscow. His fields of research include design, fabrication and characterization of physical sensors for demanding applications and microsystem integration. He has published more than 50 papers and contributed as an author to a number of patents.

iog@tcen.ru