Tablet-Size Seismometer

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Vladimir A. Kozlov and his colleagues from the Moscow Institute of Physics and Technology have known about the recent earthquake in Turkey not only from the news program, but from their own data too. The seismic impulses were received by a device they created, funding being extended by the Russian Foundation for Basic research (RFBR) and Foundation for Assistance to Small Innovative Enterprises (FASIE). Thus, a molecular-electronic transducer designed, patented, and currently tested by the researchers has instantly proved its usefulness.

There is only one worldwide producer of high-quality seismometers now - the Streckeizen Company in Switzerland. Their sensors, like all known before, are electromechanical (various kinds of movable rods like those in solenoids and movable plates like those in electrical condensers), but carefully assembled of "elements of the precise mechanics". Hence, Streckeizen sensors are much higher quality in comparison with those by other producers, like Swiss watch in comparison with mean ones. And difference by price is similar.

Saying figuratively, the Russian invention makes the Swiss quality available to everyone. An example of a similar breakthrough is electronic watch, which have important advantages in comparison with traditional mechanical watch. The new electronic sensor has analogous advantages in comparison with electromechanical sensors.

Within the past decade, the team from the Moscow Institute of Physics and Technology performed fundamental research on molecular electronics, elaborate calculations, and finest experiments. As a result, they have created new motion sensors. The project manager, doctor of physics and mathematics, Professor Vladimir A. Kozlov has told us the following.

Imagine a tube containing electrolyte and closed by membranes at both ends and two electrodes immersed into the electrolyte and resembling a three-dimensional net of finest wires. Once external acceleration is applied, the liquid naturally moves a little, to the extent allowed by the membrane. The electrodes receive an additional charge, and current in the electric circuit changes, which is the signal we receive. It is strictly connected with the value of external acceleration. The device has a wide range of detectable frequencies (from 0.005 to 100 Hz) and very low noise level. Of course, this is a very vague explanation, but we keep in secret important details (e.g., the electrolyte composition), that is our know-how. By the present moment, we have made six transducers closed inside "tablets" resembling little rounded batteries for a watch. They give us electric signals, which can be amplified and put into digital form by standard methods. We have already planned all the technological process, which is quite simple. Hence, sensors launched into mass production will be cheap. You know, seismologists have a "pipe dream" about covering our entire planet by a network of motion sensors. That has been practically impossible until very recently: Swiss sensors are too expensive, and other ones are not very sensitive and precise. From now on, the dream of seismologists can come true. At any rate, we have designed proper sensors for them.

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