RELEVANT MATERIALS FOR HIGH-TEMPERATURE SENSORS

Ye. Bilchuk

Institute of Engineering Thermophysics of NAS of Ukraine
2-a, Mariy Kapnist Street, Kyiv, 03057, tel.: (044) 456 94 82,
e-mail: mistok9@gmail.com

Improvement of nondestructive testing and technical diagnostics requires the development of new sensors as sources of primary information on the state of technology. Various equipment has been developed for heat meters, but increasing its thermal stability requires further research.

The objective is to develop relevant materials for high-temperature sensors.

The review of modern materials for high-temperature sensors (over 900 K) has established that traditionally used cost and scarcity materials based on platinum, tantalum, tellurium, gadolinium, and others. These materials are incoordination with the potential of the resource base and industrial production in Ukraine. For the further development of the equipment for the heat meter, it is necessary to research new materials taking into account the indicated technical and economic conditions.

We proposed relevant materials for high-temperature sensors based on the amorphous crystalline Zr-Al-B system (up to 1470 K). These materials have thermal and chemical resistance, combine high mechanical and electrical properties. This is achieved by the formation of disperse zirconium intermetallics, the containment of the material's creep boundary, the presence of a ruggedized protective oxide film. The functional properties of the proposed amorphous crystalline materials depend on the proportion of bulk particles of the amorphous and crystalline phases. This makes it possible to take more account of the operating conditions of the sensors. Sensors from the specified material have increased reliability of functioning and working temperature range, as well as the better environmental properties, and can be used in conditions of a chemically aggressive environment, physical and mechanical loads, thermal cyclic stresses.

Conclusions. It is noted that there is a need to develop economic materials based on Ukraine's resource base for sensors for high temperatures. Proposed relevant materials based on Zr-Al-B, as protective elements of domestic sensors such as "RegMic" instead of ceramic shell. This has improved the functional properties of sensors in high temperature and aggressive environments.