THERMALLY STABLE CONDUCTING POLYMER MATERIAL WITH SELF-REGULATED HEATING TEMPERATURE

Description
The material is an electrically conducting polymer composition of a thermally stable polymer and a mixture of carbon filling agents. The material is designed to produce fuel elements in electric heaters.

Technical specifications
Depending on the composition and application, the material has the following characteristics:

- specific electric resistance $10^{-2}$ to $10^{-3}$ ohm-m
- positive temperature resistivity (+TCR) $10^{-2}$ to $10^{-3}$ deg$^{-1}$
- temperature region of self-regulation 80-100 °C
- density 1.5-2.0 g/cm$^3$
- the material is resistant to hostile media and inert toward other materials at the level of fluoroplastics.

The properties of the material ensure temperature control in electric heaters without using temperature regulators.

Technical appraisal and economic benefits
The main advantages of the material are the elevated admissible heating temperature and the self-regulation effect achieved by a choice of appropriate constituents and characterized by a temperature dependence of the electric properties of the material.

Due to the absence of temperature-controlling devices, the heaters produced from the designed material exhibit increased safety and reliability as well as economical expenditure of electrical power, especially under varied heating conditions.

On the Russian market, self-regulating heaters in the form of heating cables are available only from foreign corporations.

Application areas
Heaters with the temperature self-regulation effect can be used for long-term heating of pipelines, water sinks, and antifreezing devices in the oil and gas industries and in municipal services, and also for heating equipment and structures at extremely low temperatures.

Development stage
The material has been tested in the heaters of spacecraft compartments at the Teplotekhnika Design Bureau (Kokchetav, Kazakhstan) and has been used to heat oil in internal combustion engines.

Patent situation
The material composition and the heater design were patented in the Russian Federation.

Commercial offers
Joint design, production, and marketing of heaters.

Estimated cost
Price is to be negotiated. The cost of the material is lower than that of foreign counterparts.

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