Urgency

To substitute firefighters in risky situations a special device should be made. E-filling of such a device should be produced only from a thermostable material, which can preserve its electric properties even in fire.

Problem

- The existing thermostable materials (manganin and constantan) are pretty heavyweight. They have low specific heat (they are easily heated). The cost of manganin and constantan is high.
- Resources preservation and recycling are topical problems of today.

Purpose

Production of a new thermostable material with high specific heat, low cost and light weight.

Hypothesis

A new thermostable material with high specific heat, low cost and light weight can be produced under the following conditions:

- melting metal conductor with semiconductor (aluminum with silicon dioxide);
- defining optimal mass ratio of aluminum and glass;
- crystallizing the alloy in the conditions of uniform electric field.

Research Plan

STEP 1. Investigation of the thermostable materials.

STEP 2. Investigation of the metals and semiconductors resistance dependence on temperature (formulating main hypothesis).

STEP 3. Selection of the optimal metal and the optimal semiconductor for production of a new thermostable material.

STEP 4. Investigation of silumin (aluminum and silicon dioxide alloy) electrical properties.

STEP 5. Identification of the optimal mass ratio of the components for the alloy: production of new material on the basis of crushed cullet and aluminum cans alloying, with different mass ratio of glass and aluminum; investigation of the produced alloys resistance dependence on temperature.

STEP 6. Production of a new material on the basis of crushed cullet and aluminum cans alloying, with crystallization in conditions of uniform electric field. Investigation and matching of AluGlass1 and AluGlass2 resistance dependence on temperature.

STEP 7. Study of AluGlass resistivity and temperature coefficient of resistance and matching these data with tabular values of the thermostable materials.