COOLING WITHOUT ELECTRICITY

I. Zakliuka

Faculty of Electric Power Engineering and Automatics,

National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

On hot days, every person on the planet carries out a routine thing – we switch on the air conditioner, thus increasing both the heavy load on the network and bills

for electricity. Hence, the natural question arises: “Is it possible to create coolness without electricity?”

Yaron Shenhav, one of the co-founders of the Israeli company SolCold, and his team are working on an innovative project – a light-filtering paint that can provide better cooling of buildings as a result of exposure to sunlight, and if the experiments are successful, it can be used as a cooling coating for space equipment.

This technology uses the principles of laser cooling, in which the collision of specially developed materials with a laser beam can cool the materials down, by approximately 150°C. The basic idea is this: in these special materials, the molecules absorb photons of the light having one frequency, and at that time there is a repeated spontaneous emission of high-frequency photons that carry more energy. Since energy is lost, the temperature of the material in this process decreases [2].

Despite the fact that it was not convenient to install lasers on the roofs of the houses, Yaron Shenhav wanted to see if it was possible to adjust the technique so that instead of lasers it could be operated with sunlight. The main difficulty was that the frequency range of laser light is much narrower than the spectrum of the sun. Therefore, the team came up with a paint consisting of two layers. The main function of the outer layer is the filtration of sunlight, thereby reducing the frequency range of sunlight. The inner layer transforms heat into light thereby cooling the paint below the ambient temperature [3].

At present, the light-filtering paint has been successfully tested in the laboratory. The best results of this material showed on metal roofs and over low ceilings. Experiment simulation shows that if you apply paint on the roof of the house, the temperature in the room will drop by 10°C. Further tests on buildings will be conducted within the next two years [2].

However, the present invention has certain disadvantages. The cost of covering 10 square meters is about $ 30, which is not quite cheap. Still, for large commercial buildings such as shopping malls and supermarkets, this paint can reduce energy consumption by up to 60%, thereby reducing electricity bills.

Another advantage is that reduced electricity consumption will lower carbon emissions and decrease the temperature in large cities in the Middle East, Africa, Latin America and South-East Asia.

There is also a possibility of using this material in space programs, namely for cooling objects in space. This seems odd because of the low temperatures in space, but the main problem is actually the lack of air that would allow the heat to be transferred from the object. The light-filtering paint would allow the heat to be removed, because the energy transfer in it occurs through light.

The invention of SolCold is not the only example of using paint for cooling cities. In Los Angeles, USA, the authorities ordered the roads to be covered with a special paint solution similar to that used to cool about two dozen streets in the city in order to reduce the record temperature in the city. Another example is the White House Roof, created in New York by a human rights group. The main idea behind this project is to cool the houses by painting them in white [1].

To conclude, although the innovation project of a light-filtering paint has some disadvantages, these are insignificant compared to the grand prospects it will be able to offer if at the end the testing turns out to be successful.

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