

Superconducting ink heats water instantly

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Young researchers created a superconducting heat ink that functions as a solar heater. It heats water up to 68 degrees Celsius and is 40 percent cheaper than commercial inks.

"A pipe exposed to the sun reaches a temperature of 40 C°. If we add the superconducting <u>ink</u>, the temperature increases 70 percent and reaches 68 C°," says Sandra Casillas Bolaños, master at the Technological Institute of the Lagoon (ITL), in north of Mexico, and head of the project.

She explains that the ink acts as a boiler that contains nanoparticles activated by solar energy and increase the temperature.

The ink is made of two layers. The first is an internal magnetic titanium nanoparticle, which is responsible for trapping the heat, and the second is external and consists of a coating of tungsten (filament in <u>light bulbs</u>), which researchers transform into a nano salt and adhere with polyvinyl alcohol, to finish with a layer of copper.

Using a treatment called burnishing, copper blackens to trap and retain heat inside the particles. "Thus, the center is heated more intensely: first the titanium, then tungsten and finally the copper."

The project has been developed for two years and the product is classified as an ink because it uses a series of solvents, making it fast drying and with an odor similar to hair dye.



The ink is applied on the surface of a conventional pipe that carries water. To potentiate the heat, the researchers put two layers of PET bottles over the tubes in order to create a greenhouse effect and raise the temperature faster, as well as to protect the ink from outdoor wear.



Water flowing for five meters heats to 68 C° quickly, even in cloudy weather. Sandra Casillas adds that the ink was implemented in a major sports complex to heat a pool, raising two million cubic meters of water from 26 to 37 C°.

To achieve this, the researcher and her team placed tubes covered with



ink on the edge of the indoor pool with a pump that pulled the liquid from for a period of time. As it flowed, the water was heated and reached the ideal <u>temperature</u>.

The researchers are in the process of patenting the innovation, which is expected to be marketed at 600 pesos a liter (about \$40); however, house piping costs only 150 pesos (\$10), because very little is needed, says Casillas Bolaños.

The professor at ITL says that the difference between this technology and the ones that already exist in the market is that others are made with expensive metals, while the new technology contains tungsten, which is 40 percent cheaper.

The next step is to optimize it and create more ink in large volumes, because it is currently done step by step, and each nanoparticle is fine tuned.

Provided by Investigación y Desarrollo

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