

Radiophysicists double the efficiency of solar cells

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Credit: Tomsk State University

Anton Pischagin, a graduate student of the Faculty of Radiophysics

advised by Professor Andrey Kokhanenko, is developing nanostructures based on silicon for converting solar energy into electricity. These materials will allow doubling the efficiency of solar cells.

Based on the results of experiments with existing semiconductor nanostructures, TSU scientists plan to increase the efficiency of [solar cells](#) 35 to 40 percent. The maximum possible efficiency of such batteries, according to theoretical calculations, is 53 percent.

Similar developments are being carried out in research centers in the U.S., Canada, Germany, France and Japan, but such techniques do not exceed 25 percent efficiency, and solar cells with quantum dots are only 12 percent efficient.

"One of the methods to improve the efficiency of solar cells based on silicon is sputtering germanium quantum dots," - says Anton Pischagin. "Using such points will allow collecting the solar energy in the range of visible and infrared radiation (up to 1.6 microns) and thus improve the efficiency of conversion of [solar energy](#) into electricity."

According to this scientist, many researchers are now working with structures based on [gallium arsenide](#), but the structure of the [silicon solar cells](#) with [quantum dots](#) is much simpler, which makes them cheaper to manufacture. In comparison, gallium arsenide solar cells are composed of multiple cascades of multilayer structures, each of which absorbs energy in a separate band, but for the absorption and conversion of the same amount of energy, one cascade of multilayer silicon structure is sufficient.

Currently, scientists of the Faculty of Radiophysics are determining the optimum number of atomic layers of the structure, their thickness, the concentration of germanium islands, and other parameters to improve [efficiency](#).

Helioenergetics is currently the most environmentally friendly source of energy. Solar panels can be used in aerospace, in the military and civilian sectors, and in the construction of electrical generating stations for different purposes than the autonomous power supply system of a country house to ensuring the electricity for entire regions.

Provided by Tomsk State University

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