Novel thermoelectric nanoantenna design for use in solar energy harvesting

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I-V curves: (a) CDN - Ni-Pt, current in function of voltage (black line) and the electrical potential in 225 function of voltage (blue line). (b) EDN - Ni-Pt, current in function of voltage (black line) and the electrical 226 potential in function of voltage (blue line). Credit: Javier Mendez-Lozoya et al.

In an article published in the SPIE Journal of Nanophotonics (JNP), researchers from a collaboration of three labs in Mexico demonstrate an innovative nanodevice for harvesting solar energy. The paper, "Thermoelectric efficiency optimization of nanoantennas for solar energy harvesting," reports that evolutive dipole nanoantennas (EDNs) generate a thermoelectric voltage three times larger than the classic dipole nanoantenna (CDN).

The nanoantennas are bimetallic, using nickel and platinum, and were fabricated using e-beam lithography. The nanoantenna design was optimized using simulations to determine the distance between the elements. In comparing their thermoelectric voltage to the classic dipole nanoantenna, the EDNs were 1.3 times more efficient. The characterization was done using a solar simulator analyzing the I-V curves. The results indicate that EDN nanoantenna arrays would be good candidates for the harvesting of waste heat energy.


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