Scientists develop a tool for wireless charging of multiple devices

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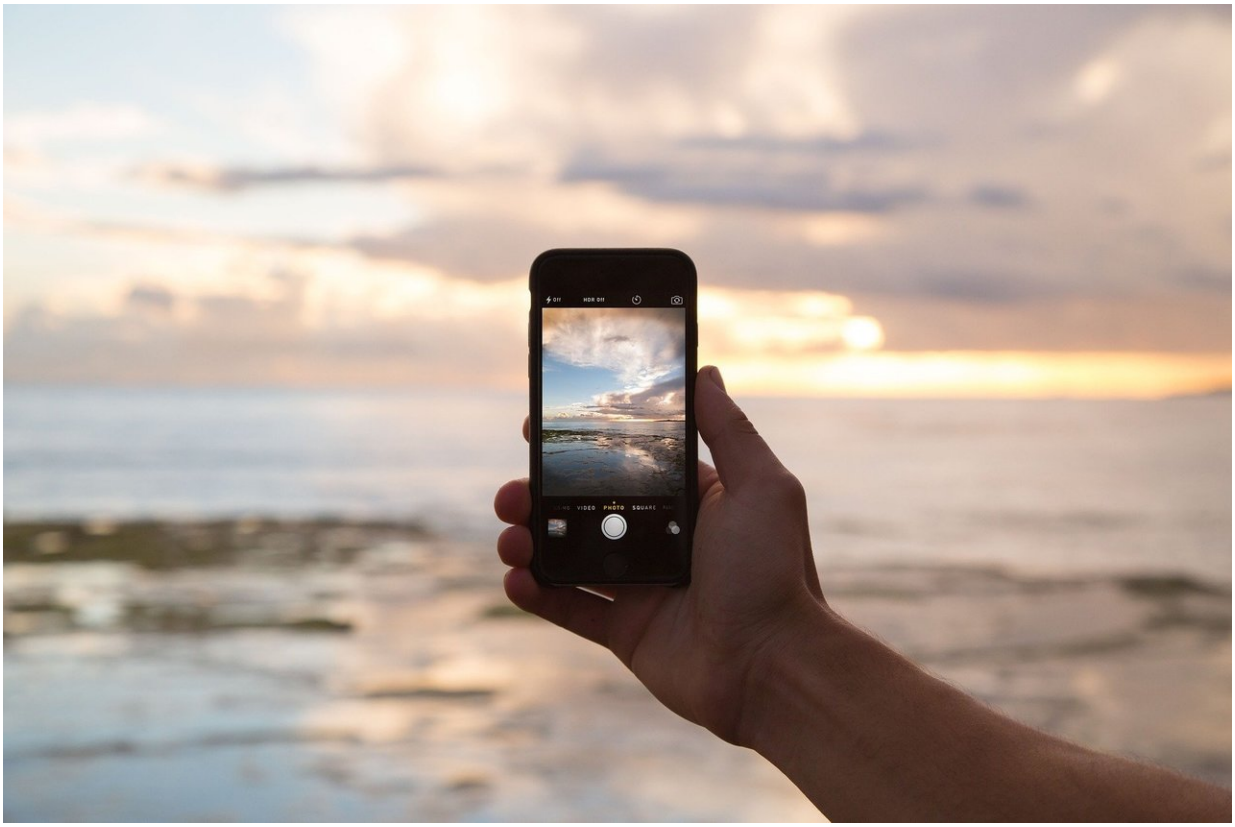

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Researchers from the Faculty of Physics and Engineering managed to achieve simultaneous power transfer at various frequencies with the help of a metasurface. It will allow us to simultaneously charge devices from

different manufacturers with different power transfer standards. The paper was published in *Applied Physics Letters.*

When we need to borrow a charger for our device, we often face the fact that different manufacturers produce different charger connectors. Wireless charging isn't a solution either: companies use different power transfer systems that work at different frequencies.

"There are various wireless power transfer standards with different frequencies, so you can't just use a charger by any manufacturer," says Polina Kapitanova, a researcher at ITMO University's Department of Physics and Engineering. "For example, Huawei uses one wireless power transfer frequency for mobile phones and another—for smart glasses, so you can't charge these devices with the same charger."

It's not very efficient. Many researchers are working on wireless charging surfaces suitable for several devices. One of the research teams engaged in this problem is based at ITMO University's Department of Physics and Engineering.

"What we propose is a brand-new metasurface that can be used as a transmitter in the wireless power transfer system that would allow users to charge several devices at once," says Polina Kapitanova. "This surface can be used at one frequency or at several."

The designed metasurface is made out of conductors arranged in a special way. They are connected with capacitors that tune into the necessary frequency. Such a system can spread on quite a large area, so that it can be used as a table or a nightstand functioning as a big charger.

"As it turned out, this structure has unique properties, including reverse frequency dispersion that can be efficiently applied in wireless power transfer," explains Polina Kapitanova. "This structure has several modes

(resonant frequencies) that have a uniform magnetic field. It allows us to transfer energy wirelessly. At the same time, the electric field is hidden at the edges of the structure, at the capacitors, and it's safer for users that way."

This concept is a part of a promising smart table project by scientists from ITMO University's Department of Physics and Engineering. They created a prototype of the metasurface and studied its properties with different frequencies.

"In this paper, we present a demo version: we place several receiving resonators loaded on light-emitting diodes with different working frequencies on the metasurface," says Mingzhao Song, a researcher at the Department of Physics and Engineering. "The diodes light up regardless of the position and orientation of receivers, which means that energy gets transferred."

Now the scientists need to evaluate the level of decrease in the electric field in order to make the charger safer and faster.

More information: Mingzhao Song et al, Multi-mode metamaterial-inspired resonator for near-field wireless power transfer, *Applied Physics Letters* (2020). DOI: 10.1063/5.0012006

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