Using micro-windmills to recharge cell phones

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Nano-windmills will charge our cell phones in the future. This is what scientists at the University of Texas at Arlington stated at the beginning of this year. J.-C. Chiao and Smitha Rao developed a small device that is just 1.8 mm at its widest point. It is calculated that 9 more of the same devices could be attached to a grain of rice. Yes, a total of 10 windmills could be gathered onto a single rice grain. And hundreds could be arranged onto an area of a cell phone battery. Wind could be created by waving the phone, or in the lazy way – by placing it at the window on a windy day. Smitha Rao works in the field of micro-robotics for a long time ago which caused an interest from a Taiwanese company in having Rao and Chiao developments about device designs and applications for the fabrication process of the company's production line. This company is WinMEMS Technologies Co, which was firstly impressed by Rao's 3D mechanical structures able to assemble themselves from 2D metal pieces by using planar multilayer electroplating techniques. "The company was quite surprised with the micro-windmill idea when we showed the demo video of working devices," Rao said. "It was something completely out of the blue for them and their investors." Chiao added: "The micro-windmills work well because the metal alloy is flexible and Smitha's design follows minimalism for functionality." The Taiwanese company and UT Arlington had to reach an agreement about the developments due to the big interest from WinMEMS. And it was reached: UT Arlington will own the intellectual properties of the developments, and the company will

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investigate the commercial potential. A lot of UT Arlington's works were advertised by WinMEMS on their website and in many public presentations. Except the windmills, subjects of this advertising were also different inductors, gears, pop-up switches and grippers. Similar feature for all of these devices is that they're thinner than a human hair. These things could be used in the future as components of nano-robots with various applications and for tools for manufacturing micro-machines. Smitha Rao earned her Ph.D in 2009 at UT Arlington. She said: "It's very gratifying to first be noticed by an international company and second to work on something like this where you can see immediately how it might be used. However, I think we've only scratched the surface on how these micro-windmills might be used." Rao stated that her windmills are extremely strong and reliable because of the nickel alloy they're made of, and also because of their special aerodynamic shape. The devices were tested in September, 2013 and operated successfully even under strong artificial winds.

"The problem most MEMS designers have is that materials are too brittle," Rao said. "With the nickel alloy, we don't have that same issue. They're very, very durable." According to UT Arlington, the cost for manufacturing one windmill is the same as the cost of producing hundreds or even thousands on a single wafer, which promises the production of inexpensive systems.

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