

Tiny static electricity generators could produce power from waves

A smart way of putting together lots of nanogenerators that exploit static electricity to generate a current could open up a new kind of wave power

TECHNOLOGY 16 September 2022

By [Michael Le Page](#)



Wave energy is a huge potential clean source of electricity

Cavan Images/Alamy

Wave power may be about to get a boost from tiny generators that rely on a phenomenon called the triboelectric effect. A team in China has unveiled a design that doubles the previous record for this technology for power generated per unit volume.

Unlike [with wind and solar power](#), high costs are still [preventing wave energy taking off](#) in a big way. Existing systems generate power when wave motion drives electromagnetic induction, which involves magnets moving through coils, but these are heavy, expensive and inefficient, says [Joao Ventura](#) at the University of Porto in Portugal.

One alternative is to create wave power systems that capture energy by exploiting the build-up of static electricity when different materials rub together, like a balloon against hair. This phenomenon is known as the triboelectric effect, and the discharge of the built-up static charge can generate a current. Devices to harness this effect are known as “nanogenerators”.

The story of our ocean told through salt [Helen Czerski at New Scientist Live this October](#)

Many teams are developing triboelectric systems for small-scale applications like [powering pacemakers](#) or generating electricity from [the motion of socks](#) or [backpacks](#), but so far [no devices containing the nanogenerators have gone on sale](#).

Because the current generated by each nanogenerator is low, for wave power, the idea is to link thousands of triboelectric nanogenerators together in long chains linked by flexible connectors. At present, many proposed wave power designs using the triboelectric effect consist of spheres that roll around inside each nanogenerator.

Now, a team led by Zhong Lin Wang at the Beijing Institute of Nanoenergy and Nanosystems in China, who created the first working triboelectric nanogenerator in 2012, has created a different design for wave power, consisting of a Slinky spring-like coil inside a cylinder. As the cylinder rocks back and forth in waves, different parts of the spiral touch each other and separate, generating a current.

In lab tests, this device produced up to 347 watts of power per cubic metre, double the best previously achieved and up to 30 times as much as other triboelectric designs.

Read more: [Can we beat climate change by geoengineering the oceans?](#)

“The group achieved a significant breakthrough in developing a new triboelectric structure that provides large power density,” says Ventura.

With triboelectric nanogenerators, the structure used to generate power is usually much larger than the thin layer of the triboelectrics, he says. “If you can pack more in the same space, you get major advantages.”

The work overcomes some of the major roadblocks preventing the deployment of triboelectric nanogenerators for wave energy harvesting, says Ventura.

But [wave power pioneer Stephen Salter](#) at the University of Edinburgh, UK, isn't convinced that triboelectric nanogenerators could outperform conventional wave power designs. What's more, because the process involves friction, wear is going to be an issue, says Salter, and the team doesn't say how it will address this.

Journal reference: *One Earth*, DOI: [10.1016/j.oneear.2022.08.013](#)

More on these topics:

Your email