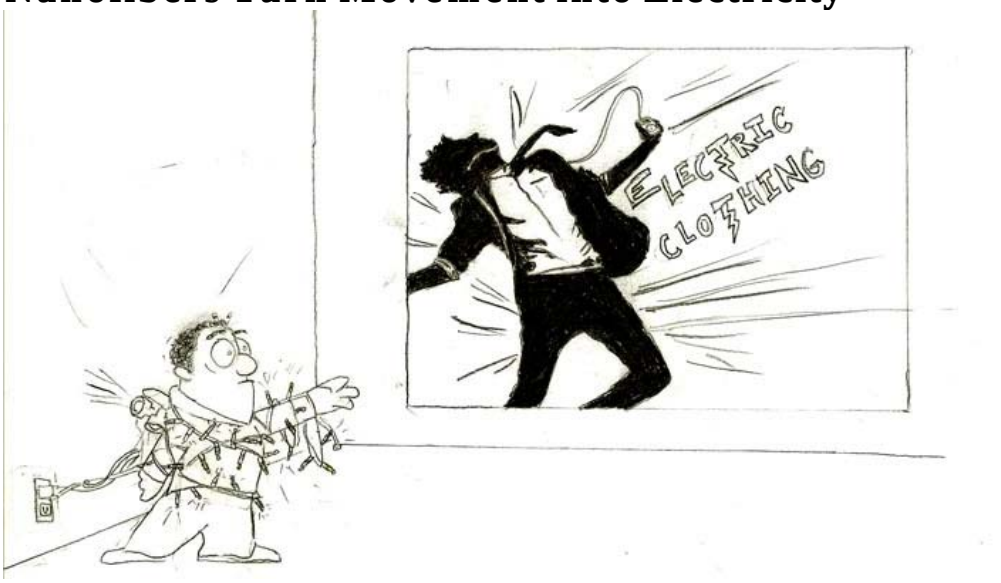
Nanofibers Turn Movement into Electricity



EVAN WALBRIDGE/ILLUSTRATION

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CONTRIBUTING WRITER
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Walking to class may not be such an energy drain in the near future, according to UC Berkeley researchers who are developing "nanogenerators" that may eventually power small electronic devices by utilizing body movements.

In a study published Feb. 10 in the journal Nano Letters, an international team led by Liwei Lin, a campus professor of mechanical engineering, outlines specific properties of the nanofibers that can convert human energy into electricity. Though the concept of piezoelectrics has been researched for years, the newest study describes how it could eventually be implemented in daily life, Lin said.

"These nanofibers can create a current when put under mechanical strain," he said. "Human movements can create this strain on clothes to generate electricity."

According to the study, the production of nanofibers is similar to processes used in existing industries.

"The fabrication process is simple and scalable, similar to those widely used for dyeing fibers and fabrics in the textile industry," according to the study.

But researchers developed the new nanogenerators using different techniques than previous research, Lin said.

He said in previous studies, researchers used "inorganic" materials that were limited by the material composition of the fibers.

The new nanofibers are made from organic materials that are not only more comfortable for those wearing the devices but can also "be deposited orderly with unlimited length with good placement precision," Lin said in an e-mail.

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"The key advance made in our work is the enhancement of energy conversion efficiency to 20 percent," he said.

But Lin said further research is needed in order to determine how to manufacture clothing that could power small handheld electronics, such as a cell phone or an iPod.

"The power from the prototype fiber nanogenerator is too low to power electrical devices," Lin said. "One can assemble many nanofibers together to power electrical devices in the future, such as an electrical watch."

Chieh Chang, a UC Berkeley graduate in mechanical engineering and lead author of the study, said in an e-mail that researchers are looking into ways to improve the nanogenerators, such as adjusting the composition of the material.

"There are a lot of aspects we are looking into to enhance the efficiency even more," Chang said in an e-mail.

In addition to developing more efficient materials, Chang said researchers are in the process of making the concept of electric clothing more feasible.

"Although it's not clear at this stage what kind of movement could generate the power needed for real applications in clothing, we expect a material to be produced within three years that is fully functional, flexible and wearable," he said in the e-mail.

Tags: UC BERKELEY DEPARTMENT OF MECHANICAL ENGINEERING

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