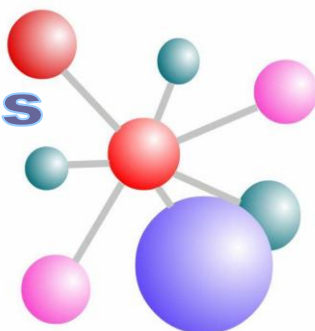


Inglês



Engenharias

Instruções

| | |
|-----------|--|
| 1 | Confira se os dados contidos na parte inferior desta capa estão corretos e, em seguida, assine no espaço reservado para isso. Se, em qualquer outro local deste Caderno, você assinar, rubricar, escrever mensagem, etc., será excluído do Exame. |
| 2 | Este Caderno contém 05 questões discursivas referentes à Prova da Língua Estrangeira escolhida pelo candidato. Não destaque nenhuma folha. |
| 3 | Se o Caderno estiver incompleto ou contiver imperfeição gráfica que impeça a leitura, solicite imediatamente ao Fiscal que o substitua. |
| 4 | Será avaliado apenas o que estiver escrito no espaço reservado para cada resposta, razão por que os rascunhos não serão considerados. |
| 5 | Escreva de modo legível, pois dúvida gerada por grafia, sinal ou rasura implicará redução de pontos. |
| 6 | Só será permitido o uso de dicionário INGLÊS/INGLÊS. |
| 7 | Use exclusivamente caneta esferográfica, confeccionada em material transparente, de tinta preta ou azul. Em nenhuma hipótese se avaliará resposta escrita com grafite. |
| 8 | Utilize para rascunhos o verso de cada página deste Caderno. |
| 9 | Você dispõe de, no máximo, três horas, para responder as 5 questões que constituem a Prova. |
| 10 | Antes de retirar-se definitivamente da sala, devolva ao Fiscal este Caderno. |

Assinatura do Candidato: _____

As questões de 01 a 05, cujas respostas deverão ser redigidas EM PORTUGUÊS, referem-se ao texto abaixo.

Engineers Create First Motion-Powered Nanodevice

by Dave Mosher on 29 March 2010.

Someday soon, simply walking with your iPod in your pocket could keep it charged, and the lub-dub of your heart could power a portable blood-pressure sensor. These innovations might be based on flat, paper clip-sized “nanogenerators,” unveiled online this week in *Nature Nanotechnology*, that pump out the same voltage as an AA battery when they are squeezed, bent, or shaken. Previous motion-powered prototypes made of nanosized parts have fallen short of such voltage, raising hopes that the new devices will open the door to the arena of self-powered nanoelectronics.

Scientists have already developed devices that harness mechanical energy to power electronics. In 2008, for example, researchers developed a leg brace that could power a cell phone. But the smaller a generator gets, the less power it can supply—and the unlikelier it is to charge a battery. Thus far, researchers have been unable to demonstrate a nanotechnology-based generator capable of powering any device, nanoscale or otherwise.

Materials scientist Zhong Lin Wang and colleagues at Georgia Institute of Technology in Atlanta say they have now overcome this obstacle. Wang's laboratory created two types of plastic-encased nanogenerators—each extremely thin, pliable, and about as long and thin as a paper clip. The devices' key components are so-called nanowires made of crystallized zinc oxide, a piezoelectric material that converts mechanical stress into energy. Each wire is a few hundred nanometers thick (thinner than most bacteria are long).

One device's nanowires look like a bed of nails, filled with a plastic material for durability, and is sandwiched between layers of electricity-conducting materials. When the researchers lightly squeezed this nanogenerator, it produced about 0.24 volts. That was more than enough to power two different nanosensors Wang's team developed: one to measure the acidity of a fluid, the other to detect ultraviolet light.

The other, more powerful device's nanowires resemble railroad ties, each touching opposing rails of chromium and gold. Wang's team arranged 700 of these tracks into a sheet. When the researchers lightly bent this nanogenerator, it cranked out more than 1.26 volts—about 60 times more than previous nanogenerator prototypes and close to a standard alkaline battery's 1.5 volts. Such voltage raises the possibilities for practical applications, such as keeping a cell phone battery charged without ever plugging it in. Wang is also excited about building networks of motion-powered sensors. “In your house, you could have hundreds of nearly invisible sensors around to detect fires, floods, toxic gas leaks, or even burglars,” Wang says. “The sensors would wirelessly transmit data to a computer if there's a problem, and you'd never have to charge them, plug them in, or replace a battery.”

The nanogenerators have several advantages over current devices. They don't use toxic heavy metals, like many piezoelectric materials do, which Wang says makes them environmentally friendly and safe for use inside of the body. They can also be made at temperatures below the boiling point of water—far cooler than that required for producing standard electronics. In addition, Wang notes that there is a “great potential to scale up the manufacturing of these devices” and make them commonplace.

“I think this work is promising,” says Yimei Zhu, a materials scientist at Brookhaven National Laboratory in New York state, who wasn't involved in the study. “This is the first time I've heard of motion generating some kind of voltage and powering a nanodevice.” Sang-Woo Kim, a materials scientist at Sungkyunkwan University in South Korea adds in an e-mail that the new work should have a “broad impact” on nanotechnology as the first proven “anywhere, anytime electronic system.”


Before nanogenerators show up in our clothes or cell phones, however, Wang says he would like to make them smaller, and his team needs to improve their total power output and ability to store a charge. “Those are our next challenges,” he says.

Fonte: Science Now

Questão 1

Explique o problema relatado no texto em relação ao dispositivo desenvolvido por cientistas em 2008.

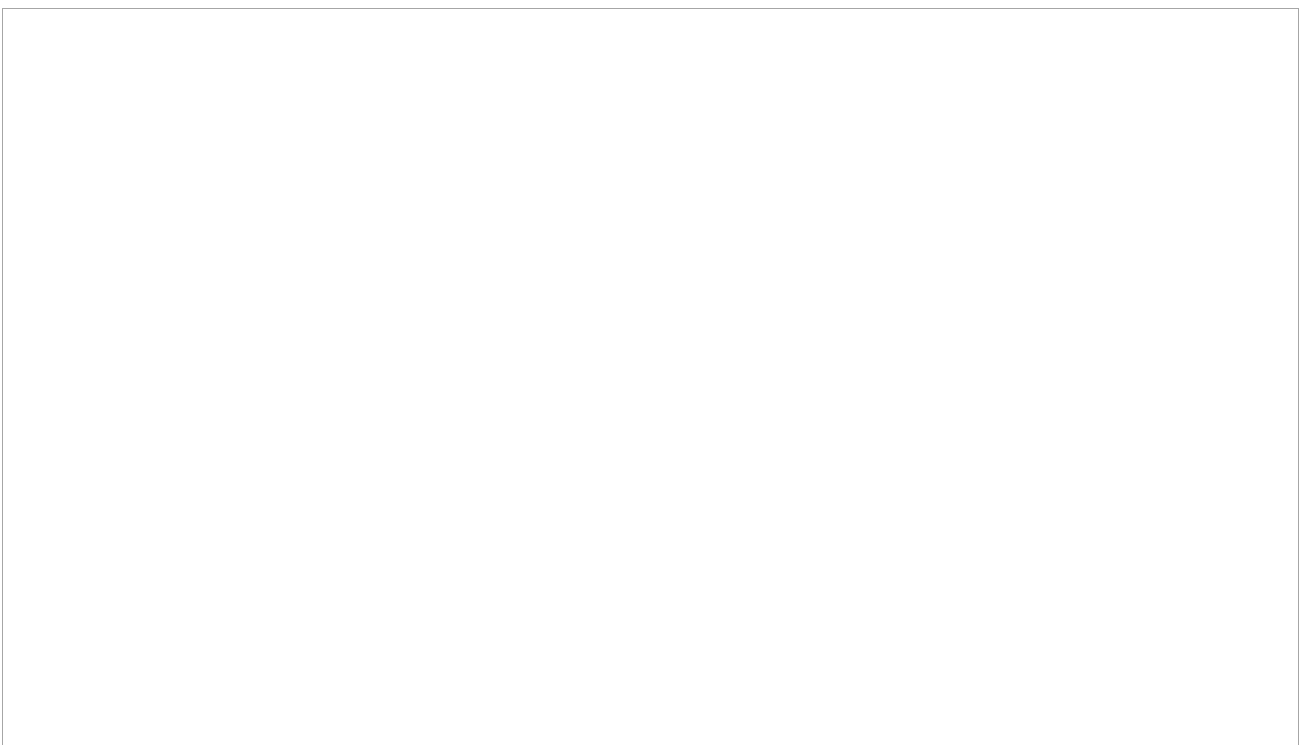
Espaço para Resposta



Questão 2

Qual o caminho encontrado pelo grupo de cientistas no sentido de superar o obstáculo mencionado na questão anterior?

Espaço para Resposta



Questão 3

Descreva o dispositivo baseado em nanofios citado no texto.

Espaço para Resposta



Questão 4

Quais as vantagens dos geradores em nanoescala (nanogeradores) sobre os dispositivos atuais?

Espaço para Resposta

