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Hybrid solar cells can generate power from raindrops and sunshine

With a TENG, solar cells could work come rain or shine



By American Chemical Society (/members/1/AmericanChemicalSociety/786) — Bio and Archives (/members/1/AmericanChemicalSociety/786)—March 12, 2018

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Despite the numerous advances in solar cells, one thing remains constant: cloudy, rainy conditions put a damper on the amount of electricity created. Now researchers reporting in the journal ACS Nano have developed hybrid solar cells that can generate power from raindrops.



In areas where it frequently rains, solar cells might not seem like the best choice for energy production. The sky becomes cloudy, preventing the sun's rays from reaching the cell. Researchers have been developing devices that can generate energy in rainy conditions. Previous studies add a pseudocapacitor or triboelectric nanogenerator (TENG) to an existing solar cell, creating a device that can make energy from the motion of raindrops. But these devices are usually complicated to manufacture and are bulky. So Zhen Wen, Xuhui Sun, Baoquan Sun and colleagues wanted to develop a better hybrid energy harvesting system.

The researchers imprinted two polymers, PDMS and PEDOT:PSS, with grooves by placing them onto commercially available DVDs. PDMS is polydimethylsiloxane and PEDOT:PSS is poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate). Adding texture to the PDMS increased the TENG performance of this material when water drops touched it and then fell off it. The textured PEDOT:PSS layer acted as a mutual electrode for both the TENG and the solar cell. It was placed between the two devices and conducted energy from the TENG to the cell. Because the polymers are transparent, the solar cell could still generate energy from sunlight, as well as from falling raindrops. The team notes this simple design demonstrates a new concept in energy harvesting during various weather conditions.

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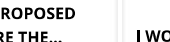










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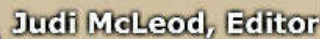
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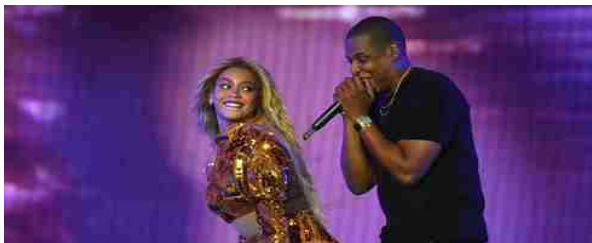
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