# Asymmetric Evaporator for Simultaneous Generation of Clean Water and Electrical Power

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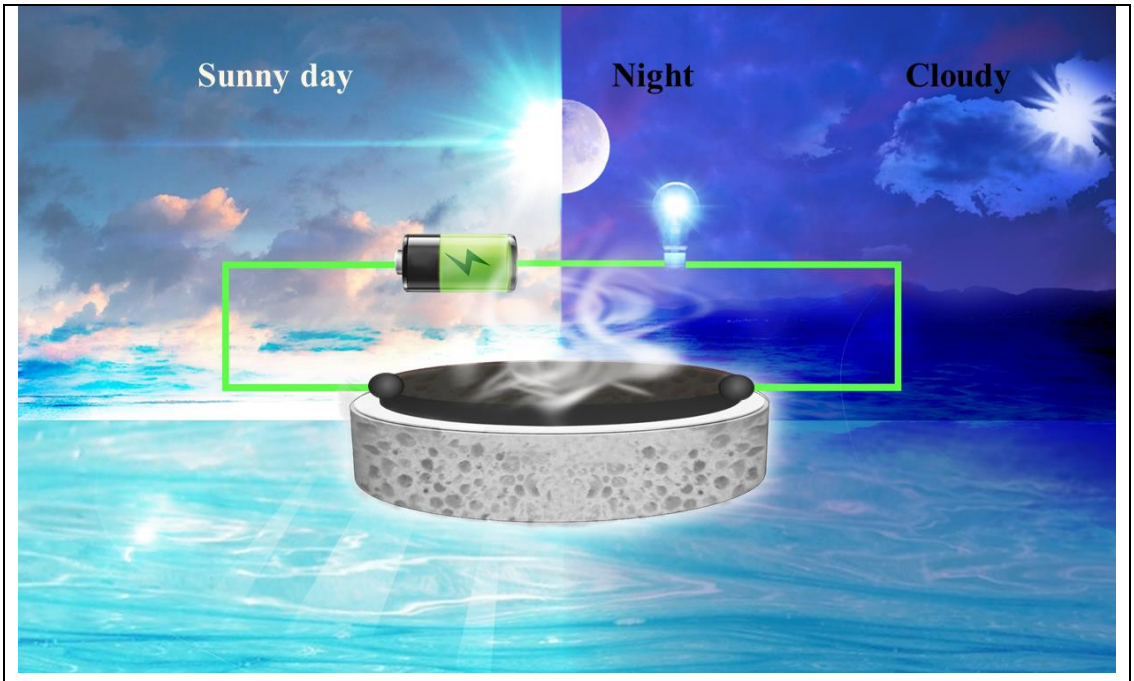
Energy shortage and environmental pollution have become global problems to be solved urgently. Therefore, continuously seeking and developing new and green renewable energy generation methods to gradually replace high-pollution and depleting fossil energy is one of the most concerning issues in the current and future development of human society. Therefore, the promising solar photothermal evaporation technology has attracted more and more attention. Solar-driven interfacial evaporation technology, using renewable solar energy to drive water evaporation, can alleviate these two problems. However, the traditional solar thermal evaporation does not make full use of environmental resources, and most solar thermal evaporation devices will put their work on hold without solar illumination. To comprehensively utilize solar energy, a new type of green and sustainable technology, water-induced electricity generation technology, has been proposed. This kind of utilization of solar energy generates both clean water and electricity, and the devices can still output electric energy in the absence of light. The overall design of full-time work not only enriches the solar-driven photothermal evaporation technology but also provides more possibilities for the comprehensive utilization of environmental resources. However, the evaporator and generator are two separate modules that need to be isolated while each operates separately, and the design/preparation process is complex, resulting in the impaired integrated use of solar energy. Moreover, the transport of fluid in solar evaporation systems is uniformly distributed in photothermal materials. Therefore, the reporter proposed a method to adjust the ion concentration gradient and non-uniform distribution of the transport fluid in the nanochannels of photothermal materials to achieve simultaneous and efficient photothermal evaporation and electricity generation. 1) A preparation method of RGO/FeOOH composite photothermal materials with full solar spectral absorption was developed, and the thermal conductivity of the composites was improved by aluminum powder doping. 2) An asymmetric film deposition strategy based on vacuum filtration method was proposed. By introducing stacked asymmetric graphene oxide layers, the asymmetry of the device is enhanced and its power generation performance is improved. 3) The preparation of multifunctional photothermal devices enables simultaneous photothermal evaporation and power generation, demonstrating the potential of generators for seawater desalination and full-time power generation.Therefore, this design provides a new direction for the simple and efficient preparation of solar thermoelectric integrated evaporation devices.




Pic.1 Asymmetric evaporator for simultaneous generation of clean water and electrical power.