A cone-shaped fluidic nanogenerator for harvesting electricity via solar steam production

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This work demonstrates a cone-shaped fluidic nanogenerator (CFN) of multi-walled carbon nanotube that can't only generate high electricity power of 500 mW/m2 but can also generate high water-evaporation rate of 1.65 and 0.615 kg·m-2·h-1 under one sun irradiation and the dark after the structure optimization, respectively. The output power of 13.18/8.24 mW·m-2 is generated with a CFN partially immersed with deionized water under 1-sun/dark irradiations. The output power of the CFN can be increased with ions contained in water due to the formation of the Stern layer that is sensitive to the mobility and concentration of the ions. The output power is generated up to 120.7/95.7 mWm-2 with seawater and maximized to 505.69/252.4 mWm-2 with a KCl solution of 0.6 M under 1-sun/dark irradiations. This new concept can guide the design of advanced energy harvesting that can persistently generate both high electricity and excellent water evaporation in all weather and all times of the day.