Solar energy-based devices for the production of fresh water and electricity from sea water

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We have developed a new solar energy-based device that produces fresh water and electricity simultaneously. Cellulose nanofibers were obrained by Tempo-mediated oxidation of bleached pulp and used to prepare a porous CNF substrate. The top surface of the CNF substrate was coated with thin layers of polypyrrole and ion exchange polymer to absorb sun light and to maintain a salt concentration gradient, respectively. The substrate was exposed to sunlight after being placed in sea water. The sea water absorbed through the hydrophilic substrate evaporated from the surface due to the solar heat, resulting in a salt concentration gradient between the upper and lower surfaces. More electricity was generated as more concentration gradient was created.