Devices For Integrated Solar Photodialysis Of Salt Water

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BRIEF DESCRIPTION

Researchers at UCI have developed a compact device for the rapid desalination of water which is driven entirely by renewable solar energy.

FULL DESCRIPTION

Irrigated agriculture, which comprises 40% of the world's food supplies and accounts for 17% of the cultivated crop land in the US alone, is highly dependent on the quality and supply of the water source utilized. Though freshwater sources have historically been heavily utilized in irrigation, their dwindling abundance in recent decades has forced agriculturists to turn to other water sources such as agricultural runoff, well water, and brackish streams. Despite their prevalence and convenience, these sources are more saline than fresh water, limiting the types of crops they can be used to irrigate. Salt that accumulates in the root most modern plants can lead to wilting, de-coloration, waxy buildup, and eventual loss in yield. In order to use naturally-occurring saline sources as sustainable irrigation sources, then, they first must be desalinated to lower their ionic concentrations to within levels safe for the plant of interest. Standard desalination techniques, such as reverse osmosis and solar distillation, are slow, expensive, and require large and expensive equipment to operate, limiting their application in more rural areas. To this end, researchers at UCI have developed a novel method for the desalination of brackish (and other moderately ionic sources) water using a device that is desirably portable, rapid, and entirely solar powered. The device uses sunlight-generated current to selectively drive salt ions through a series of membranes, which desalinates the source water. In addition, unlike standard techniques, this device is uniquely driven by a renewable energy source, which can achieve desalination at rates over 2.5 times faster than competing technologies.

SUGGESTED USES

For the solar-powered water deionization/desalination by dialysis

ADVANTAGES

· Portable: Unlike other state-of-the-art, this device is relatively small and therefore easily distributed to remote locations where brackish water is often found.

· Inexpensive: The lack of external equipment makes this device less expensive than standard methods.

· Rapid: Given appropriate salt membranes, this technology could achieve water desalination at rates >2.5 times faster than current state-of-the-art solar distillation techniques.

· Renewable: Unlike other devices, which rely on non-renewable sources of energy to drive desalination, this device utilizes renewable sunlight.

PATENT STATUS

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OTHER INFORMATION

CATEGORIZED AS

» **Agriculture & Animal Science**
» Devices
» **Energy**
» Solar
» **Materials & Chemicals**
» Agricultural
» Polymers

RELATED CASES

2018-525-0

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,673,100	06/13/2023	2018-525
Patent Cooperation Treaty	Published Application	2019/191326	10/03/2019	2018-525

STATE OF DEVELOPMENT

The device is currently in the experimental stage; though proof-of-concept has been established, true device functionality cannot be realized until the appropriate ionic-driving membranes are developed.

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