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A Ferroelectric Photovoltaic Capacitor Capable of Direct Solar Energy Conversion and Storage CHI-WEI LO, Materials Science Program, University of Wisconsin Madison, CHENSHA LI, HONGRUI JIANG, Department of Elecrical and Computer Engineering, University of Wisconsin Madison — Current solid state photovoltaics and conventional photoelectrochemical cells are not capable of directly storing the converted energy which has to be facilitated by connecting to external storing devices, thus increasing the system complexity. It would thus be highly desirable to create photovoltaic devices that can store solar energy directly. We here report a photo-rechargeable photoelectrochemical capacitor with direct conversion and storage capability by utilizing ferroelectric polyvinylidene fluoride (PVDF) gel with energy storing capability between anode and cathode. With the aid of ferroelectric effect, the device is able to maintain equilibrium between electric field and diffusion force. Results have shown that the device can be charged photovoltaically under 1 sun equivalent of irradiance to an open-circuit voltage of 0.47V, and with capacity of 40.63mC/cm^2. The storage lasts more than 24 hours. Electrochemical impedance analysis and ferroelectric hysteresis are also carried out to show its energy storing capability.

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