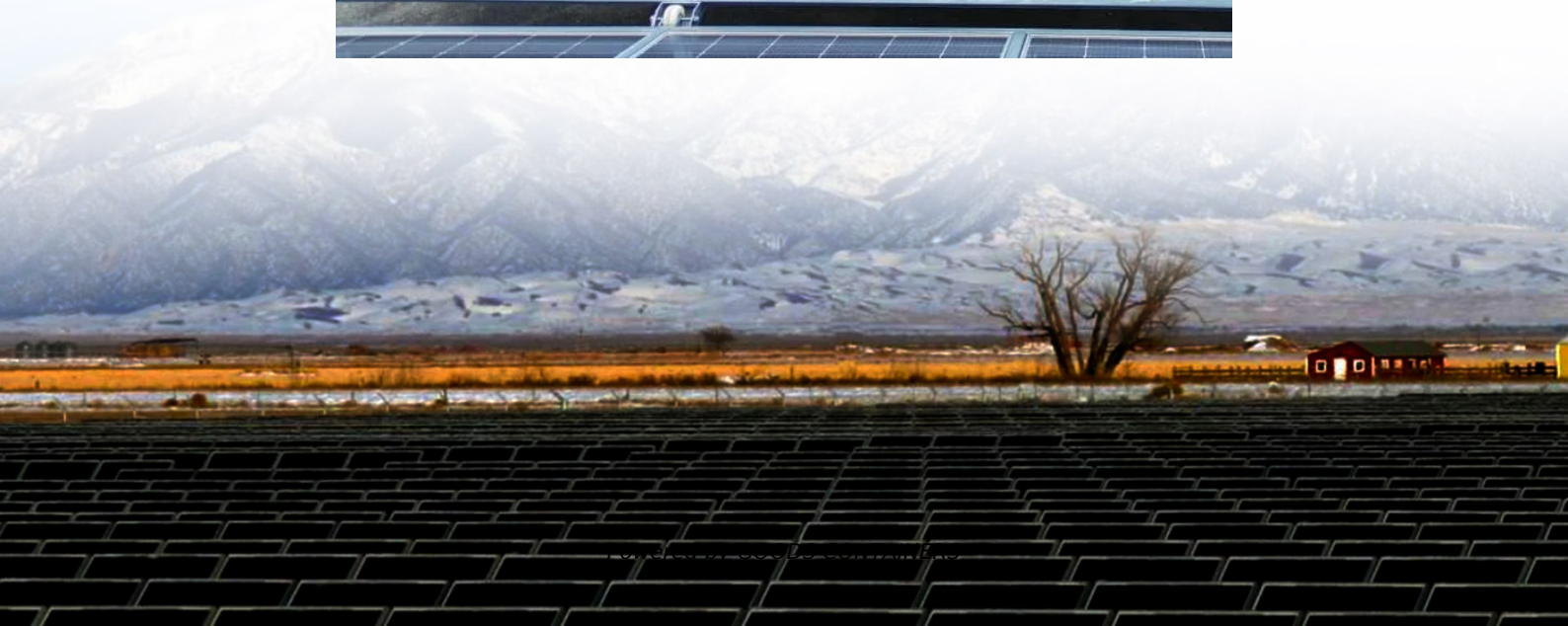


# **Super Farad capacitor self-discharge**





## Overview

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What is self-discharge in a supercapacitor?

Self-discharge is the loss of capacity caused by a spontaneous drop in voltage when a supercapacitor is left under an open circuit after charging, which is driven by Gibbs free energy [29, 30]. The degree of self-discharge also varies for different types of supercapacitors .

Why do supercapacitors self-discharge fast?

For supercapacitors, the fast self-discharge is caused by the energy storage mechanism (adsorption behavior) of their two electrodes, which has no ion-limiting mechanism, leading to the quick diffusion of the ions adsorbed on the electrodes during delay under the concentration gradient .

Can a supercapacitor analyze self-discharging data?

The method presented here to analyze self-discharging data from a supercapacitor could provide a quick and easy method to access useful information that governs internal behavior during decay. As such, the method might therefore become a useful tool that complement existing techniques.

How is voltage measured over a self-discharging supercapacitor?

In most cases the voltage is measured over a self-discharging supercapacitor, and it is therefore of interest to find its time-dependency according to the theory presented here. Let us assume that the charge stored is proportional to the voltage according  $Q(t) = C(t)V_c(t)$ , where  $C(t)$  is a time-dependent capacitance.



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