

ULTRACAPACITOR

- Unlike ordinary capacitors, supercapacitors do not use the conventional solid dielectric, but rather, they use **electrostatic double-layer capacitance** and **electrochemical pseudocapacitance**, both of which contribute to the total capacitance of the capacitor.
- Every electrochemical capacitor has two electrodes, mechanically separated by a separator, which are ionically connected to each other via the electrolyte. The **electrolyte is a mixture of positive and negative ions** dissolved in a solvent such as water. At each of the two electrode surfaces originates an area in which the liquid electrolyte contacts the conductive metallic surface of the electrode. This interface forms a common boundary among two different phases of matter, such as an insoluble solid electrode surface and an adjacent liquid electrolyte. In this interface occurs a very special phenomenon of the **double layer effect**.
- Applying a voltage to an electrochemical capacitor causes both electrodes in the capacitor to generate **electrical double-layers**. These double-layers consist of two layers of charges: **one electronic layer is in the surface lattice structure of the electrode**, and **the other, with opposite polarity, emerges from dissolved and solvated ions in the electrolyte**. The two layers are separated by a monolayer of solvent molecules, e.g., for water as solvent by water molecules, called inner Helmholtz plane (IHP). This double-layer phenomena stores electrical charges as in a conventional capacitor.

