Since energy storage devices are often used in a magnetic field environment, scientists regularly explore how an external magnetic field affects the charge storage of nonmagnetic aqueous carbon-based supercapacitor systems.

Recently, an experiment designed by Prof. Yan Xingbin’s group from the Lanzhou Institute of Chemical Physics (LICP) of the Chinese Academy of Sciences has revealed that applying an external magnetic field can induce capacitance change in aqueous acidic and alkaline electrolytes, but not in neutral electrolytes. The experiment also shows that the force field can explain the origin of the magnetic field effect.

In this work, the researchers first reported that the external magnetic field indeed affects the charge storage of a nonmagnetic aqueous carbon-based supercapacitor system, thus overcoming the negligible effect of the magnetic field on nonmagnetic electrochemical systems.

According to the researchers, the direction and intensity of the magnetic field, concentration of electrolytes and voltammetry sweep all affect the capacitance change in acidic and alkaline electrolytes.

In addition, a quantitative relationship among the limiting current density at the electrode/electrolyte interface, the intensity of the magnetic field, and the concentration and viscosity of the electrolytes was identified, which provided a completely new insight into the charge transport behavior of carbon-based supercapacitors.
super capacitors.

"By establishing the relationship between magnetic fields and super capacitors, we were able to deeply understand the transport behavior of ions in aqueous electrolytes. We expect to apply magnetic field-enhanced electrochemistry to other energy storage devices," said Prof. Yan.

The results were published online in *Cell Reports Physical Science* in an article entitled "Magnetic field induced capacitance change of aqueous carbon-based super capacitors."


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