

Ionic liquid-based supercapacitor for HEV application
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Conventional electrochemical double-layer capacitors (EDLCs) satisfy the power and cycle-life requirements for power-assist HEV application, but even the best performing on the market, don't meet the specific energy target stated by the United States Advanced Battery Consortium (USABC) and the U.S. Department of Energy (DOE), i.e. 7.5 Wh kg^{-1} total available energy at 10 s-pulse power of at least 625 W kg^{-1} .

A strategy to increase the specific energy of EDLCs without sacrificing their intrinsic, high safety, is the use of ionic liquid (IL) electrolyte in asymmetric double-layer carbon supercapacitors (AEDLCs) which allows to reach maximum cell voltages as high as 3.7 V with high cycle stability over several thousand cycles.

Here, we report the energy and power performance of AEDLCs featuring pyrrolidinium-based ILs evaluated by conventional galvanostatic cycling and by the USABC and DOE FreedomCAR benchmark protocols. The most outstanding finding is that the IL-based supercapacitor meets the dynamic power and energy capability targets stated by DOE for power-assist HEVs.

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References

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