A novel polyimide porous organic polymer for high energy supercapacitors

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Nano-porous organic polymers have emerged as excellent electrode materials in charge storage applications due to their high surface area, predictable pore sizes and charge transfer nature. Herein, we introduce a novel 2D porous organic polymer, TAPB-PPI-1 as a promising candidate for supercapacitor applications along with a large specific surface area of 1350 m^2 g^{-1} and pore size of 2.58 nm. The TAPB-PPI-1 exhibited excellent specific capacitance of 510 F g^{-1} at 1 mV s^{-1} scan rate while 388 F g^{-1} at 0.2 A g^{-1} current density in $LiPF_6$ electrolyte (See figure 1). The remarkable specific capacitance of TAPB-PPI-1 could arise from the electrical double layer capacitance aided by high BET surface area, large pore volume and extended π-conjugated system while the pseudo-capacitance favoured by redox-active nitrogen and oxygen containing functionalities. The resulted electrochemical performances of TAPB-PPI-1 found to be higher compared to the recent findings on porous organic polymer supercapacitors in organic electrolytes.

References

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Figures

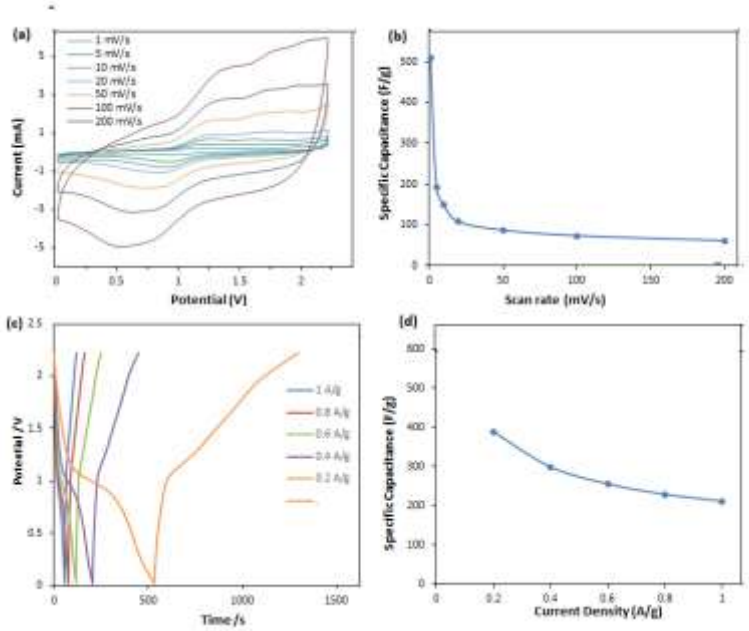

Figure 1: (a) Cyclic voltammograms (b) and specific capacitance of TAPB-PPI-1 at different scan rates in 1 M LiPF6 electrolyte. (C) Galvanostatic charge-discharge profiles (d) and the corresponding specific capacitance of the supercapacitor cell at different current densities.