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Redox-active pyrene-based pristine porous organic polymers for efficient energy storage with exceptional cyclic stability

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Abstract:

Conjugated porous organic polymers (CPOPs) are attractive materials for energy storage application due to the control over the incorporation of redox moieties and as well as pore size. CPOPs possess high specific surface area, excellent physicochemical robustness due to covalent bonds, low skeleton density and a wide structural tunability. These porous polymers have been evolved as multifunctional materials with immense potential in carbon capture, gas separation, catalysis, chemosensing, light harvesting and recently in energy storage.[1]

A novel class of pyrene-based conjugated porous organic polymers having N-containing network was developed employing Buchwald–Hartwig (BH) coupling for supercapacitor energy storage. The BH coupling reaction also ensured incorporation of amine functionalities which helps to introduce pseudocapacitance during redox reactions. The pristine polymer was found to exhibit the specific capacitance of 456 F g-1 at 0.5 A g-1 current density with excellent long-term cyclic stability. The long-term cyclic stability and the high energy density of PYBDA paves the way for further exploration of energy storage materials based on pristine conjugated porous organic polymers.[2]

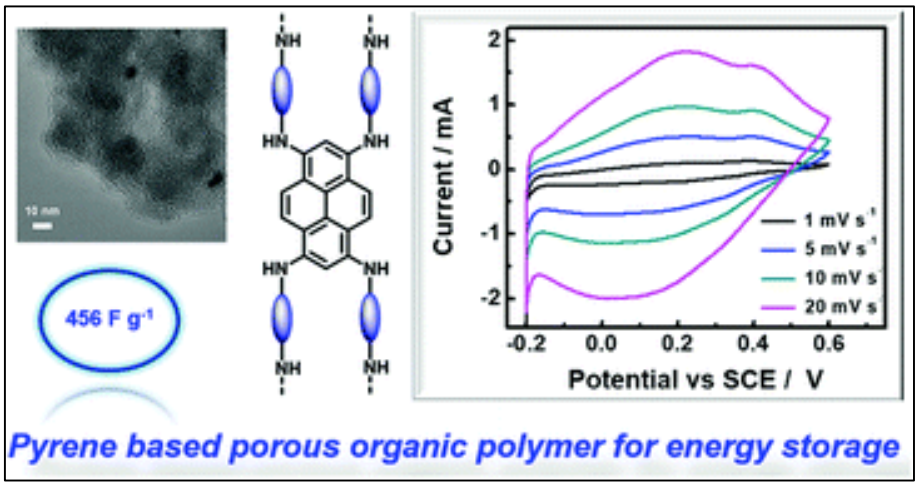

Figure: Schematic illustration of polyaromatic core of pyrene and N-containing redox-active functionalities shows excellent supercapacitor performance.

References and Notes:

1. (a) Slater, A. G.; Cooper, A. I. Science, 2015, 348, 988; (b) Bandyopadhyay, S.; Anil, A. G.; James, A.; Patra, A. *ACS Appl. Mater. Interfaces*, **2016**, *8*, 27669; (c) Hussain, M. W.; Bandyopadhyay, S.; Patra, A. *Chem. Commun*., **2017**, *53*, 10576.
2. Bandyopadhyay, S.; Singh, C.; Jash, P.; Hussain, M. W.; Paul, A.; Patra, A. *Chem. Commun*., **2018**, *54*, 6796-6799.