In the past few years, Metal-organic frameworks (MOFs) have attracted tremendous attention as new precursors to derived porous carbon materials. Among the emerging hybrid porous materials, MOFs can be designed to form a desired structure through a controllable self-assembly process based on the interplay of inorganic metal ions/metal clusters with organic. Acting as a host framework, MOFs provide a unique platform to confine the functional species, give rise to specific behaviour inside the defined pore spaces. In this work, a new strategy was developed to introduce the active site of K+ into the pores of the MOF template, playing an important role in the in-situ enhancement of microporosity and electrochemical performance for supercapacitors of the obtained porous carbons. A typical anionic MOF, Zn8(ad)4(BPDC)6O•2Me2NH2 (known as bio-MOF-1; ad = adeninate; BPDC = biphenyldicarboxylate), was selected as the “proof of concept” model due to its ion exchange feature. An ion-exchange strategy was adopted to encapsulate the potassium ion into an anionic metal-organic framework (bio-MOF-1) precursor, which derived a series of nitrogen-decorated porous carbons with high electrochemical performance for supercapacitors. In particular, the KBM-700 sample, which had a high nitrogen content (10.16%) and micropore volume (73%), exhibited high specific capacitance (230 F g⁻¹) and excellent electrochemical cycling stability (97% retention after cycling 10,000 times).


Keywords: anionic MOF, ion-exchange, porous carbon