Electronic Supplementary information (EIS) for

Exploration of calcium-organic framework as an anode material for sodium-ion batteries

Yan Zhang [a,b], Yubin Niu [a,b], Min-Qiang Wang[a,b], Jingang Yang[a,c] , Shiyu Lu [a,b] , Jin Han [a,b] , Shu-Juan Bao [a,b], Maowen Xu[a,b*]

a. *Institute for Clean Energy & Advanced Materials, Faculty of Materials and Energy，Southwest University, Chongqing 400715, P.R. China.*

b. *Chongqing Key Laboratory for Advanced Materials and Technologies of Clean Energies, Chongqing 400715, P.R. China.*

c. *Key Laboratory of Advanced Energy Materials Chemistry (Ministry of Education), Nankai University, Tianjin 300071, China.*

E-mail: xumaowen@swu.edu.cn

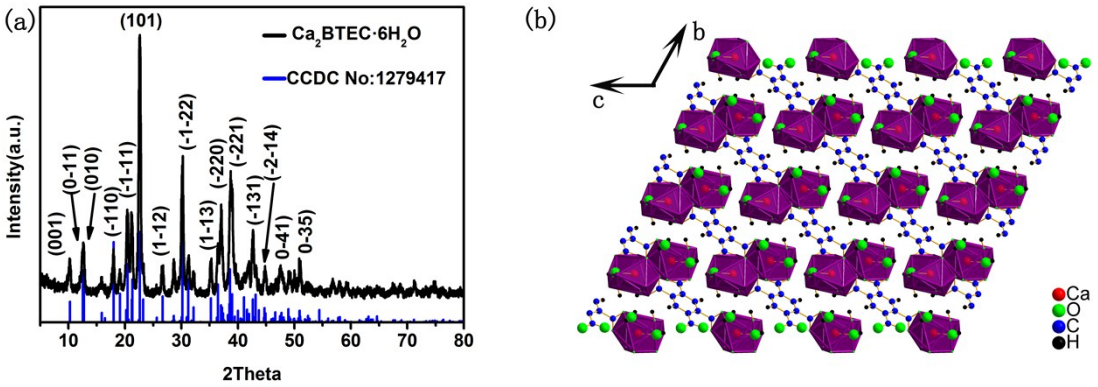


Fig.S1 The PXRD patterns and crystal structure of $Ca_2BTEC \cdot 6H_2O$

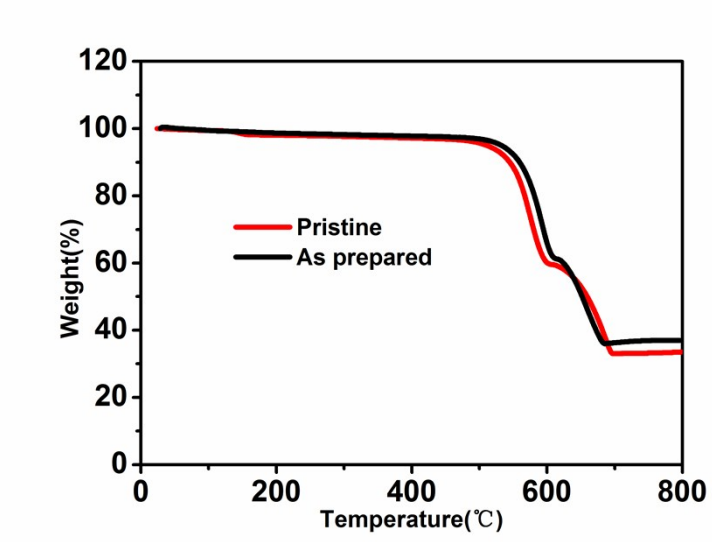


Fig.S2 TGA curves of Ca_2BTEC. **Pristine**: The Ca_2BTEC sample as synthesized; **As prepared**: The Ca_2BTEC sample prepared according to the similar procedure of electrode fabrication (first

dispersed in water and then dried at 120℃ in vacuum). The **As prepared** sample shows no obvious mass loss before 200℃ and two curves are almost overlapped indicating the hydrated compound can not form during electrode fabrication procedure.

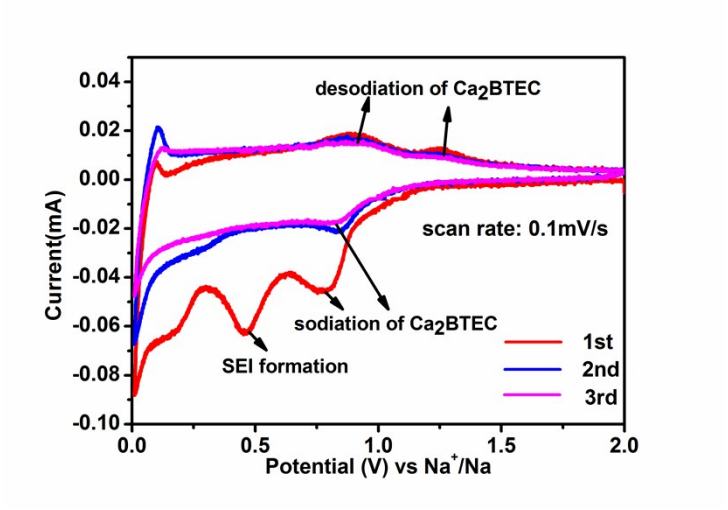


Fig.S3 CV curves of Ca_2BTEC

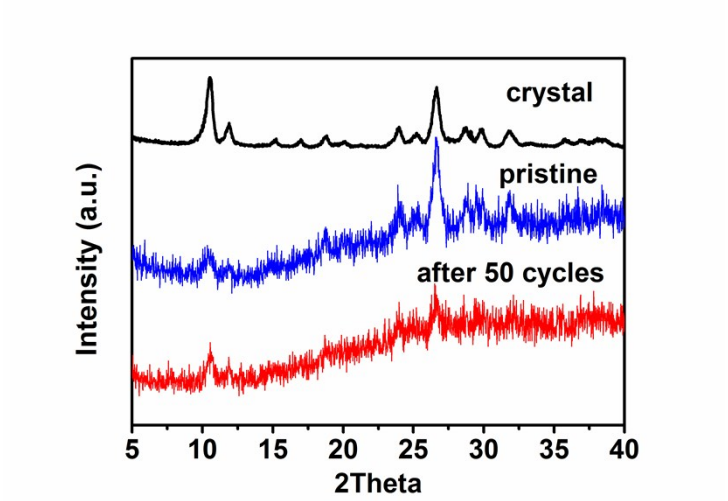


Fig.S4 Structural stability of Ca_2BTEC electrodes upon repeated discharge/charge processes. The XRD patterns of pristine electrodes and in the discharged state after 50 cycles (at a current density of 50mA/g) indicate good structural stability during repeated discharge/charge processes. This means the repeated insertion and exertion of Na^+ do not significantly affect the structure of Ca_2BTEC.

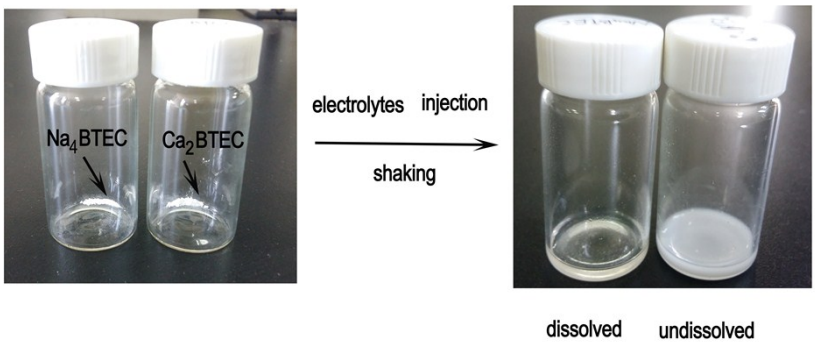
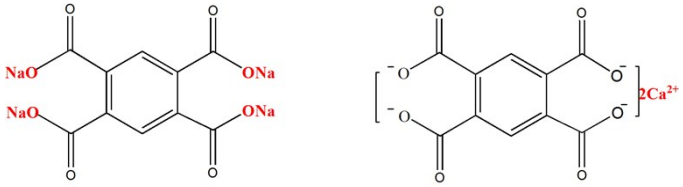


Fig.S5 The optical photographs of Na_4BTEC and Ca_2BTEC before and after electrolytes injection. After electrolytes injection and shaking, Na_4BTEC was dissolved and formed an almost transparent solution while Ca_2BTEC was not dissolved and form a white turbid liquid. The results can prove the lower solubility of Ca_2BTEC in electrolytes than Na_4BTEC.



Na_4BTEC **Ca_2BTEC**

M_w=342 M_w=330

Fig.S6 Molecular formula of Na_4BTEC and Ca_2BTEC.Due to the smaller molecular weight than Na_4BTEC, Ca_2BTEC owns a larger theoretical specific capacity.

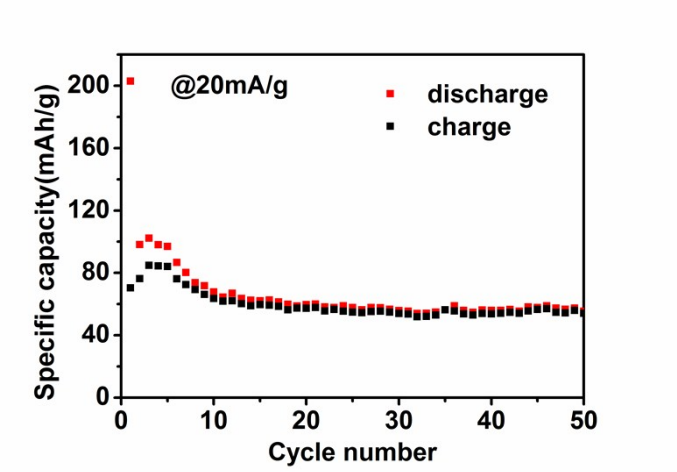


Fig.S7 The cyclic performance of $Ca_2BTEC \cdot 6H_2O$

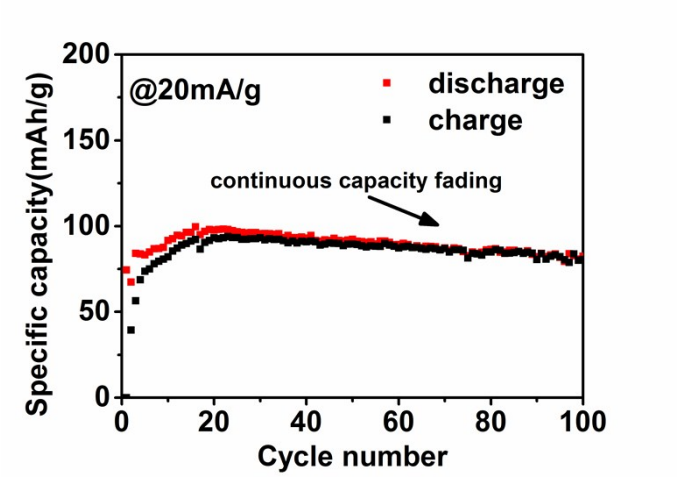


Fig.S8 The cyclic performance of Na_4BTEC

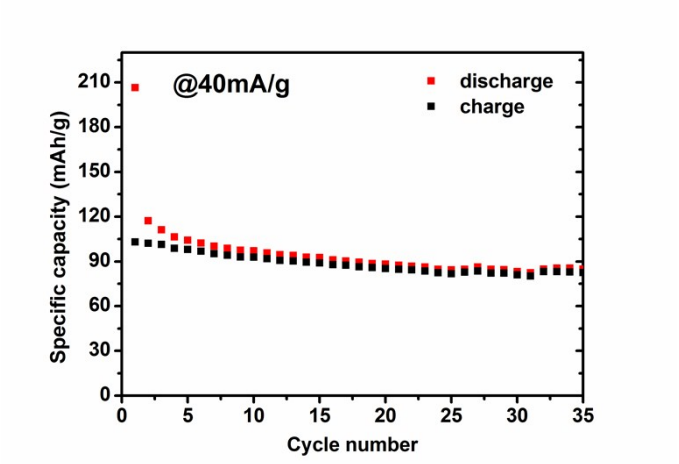


Fig.S9 The cyclic performance of Super P at a current density of 40 mA g^{-1}. The first discharge and charge capacity of super P carbon are 206.5 and 103.1 mA h g^{-1}, resulting in an initial Columbic efficiency of only 49.93%. After 35 cycles, the discharge and charge capacity fade to 84 and 82 mA h g^{-1}. In consideration of that the super P content in Ca_2BTEC electrodes is 30% by weight, so the capacity contribution of super P carbon during initial and 35^{th} cycle is only 61.95 (206.5×30%) and 25.2 (84×30%) mA h g^{-1}.