Supplementary Materials

MoP_2/C@rGO formed by the molybdenum-based metal organic framework of the phosphating GO coating with excellent lithium ion storage performance

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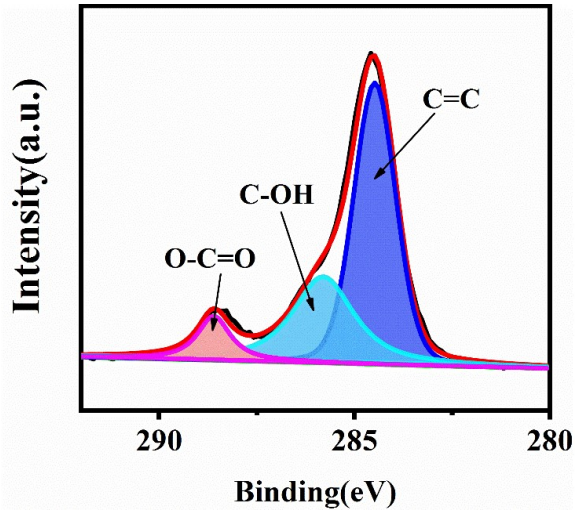

Fig.S1 C1s peak in MoP_2/C@rGO

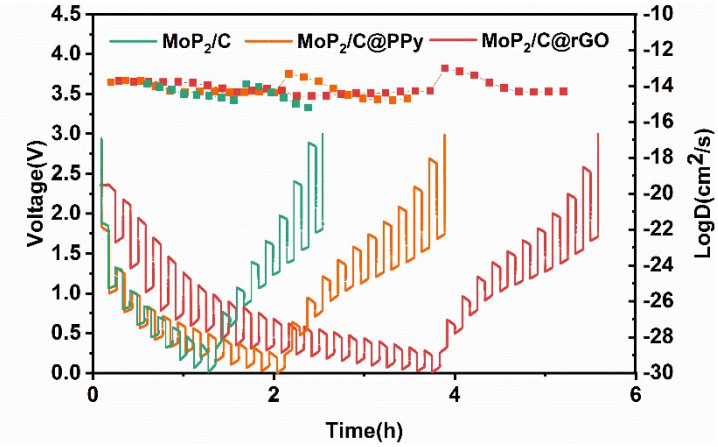

Fig.S2 GITT curves and the corresponding Li-ion diffusion coeffiient of MoP_2/C, MoP_2/C@PPy and MoP_2/C@rGO

The Li ions diffusion coefficient ($\mathbf{D_{Li}^+}$) in MoP_2/C, MoP_2/C@PPy and MoP_2/C@rGo electrodes is studied by Galvanostatic Intermittent Titration Technique (GITT) measurements. The $\mathbf{D_{Li}^+}$ values of discharge and charge process were calculated as the following.

$$D_{GITT} = \frac{4}{\pi\tau}\left(\frac{m_b V_M}{M_b S}\right)^2\left(\frac{\Delta E_s}{\Delta E_t}\right)^2 \left(\tau \ll l^2/D_{GITT}\right)$$

Where $\boldsymbol{\tau}$ and **S** represent the constant current pulse duration time (s) and the area (cm^3) for electrochemical reaction under current collector. $\mathbf{M_b}$, $\mathbf{m_b}$ and $\mathbf{V_M}$ stands for molar mass (g mol^{-1}), mass (g) and molar volume (cm^3 mol^{-1}) of electrode active material. $\Delta\mathbf{E_s}$ and $\Delta\mathbf{E_t}$ represent the change in the steady-state voltage at a single-step GITT test (V) and the total change in cell voltage during current pulse time, respectively.

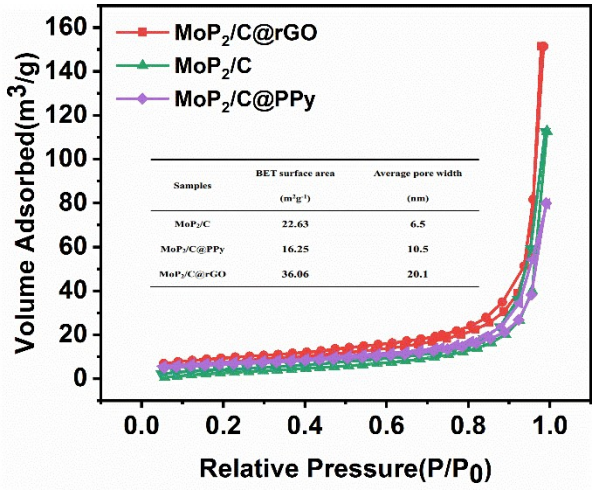

Fig.S3 Nitrogen adsorption/desorption isotherms and corresponding pore size distribution curves of MoP_2/C, MoP_2/C@PPy and MoP_2/C@rGO

Table.S1 Carbon contents

Samples	M_1(g)	M_2(g)	**carbon contents (%)**
MoP_2/C	1.0255	0.1015	**~9.90**
MoP_2/C@PPy	1.0255	0.1856	**~18.1**
MoP_2/C@rGO	1.0255	0.1907	**~18.6**

M_1(g)：the mass before acidification M_2(g)：the mass after acidification

As shown in **Table.S1**, carbon contents of three samples are calculated by the mass before and after acidification. The carbon contents of MoP_2/C, MoP_2/C@PPy and MoP_2/C@rGO are 9.9%, 18.1% and 18.6%, respectively,

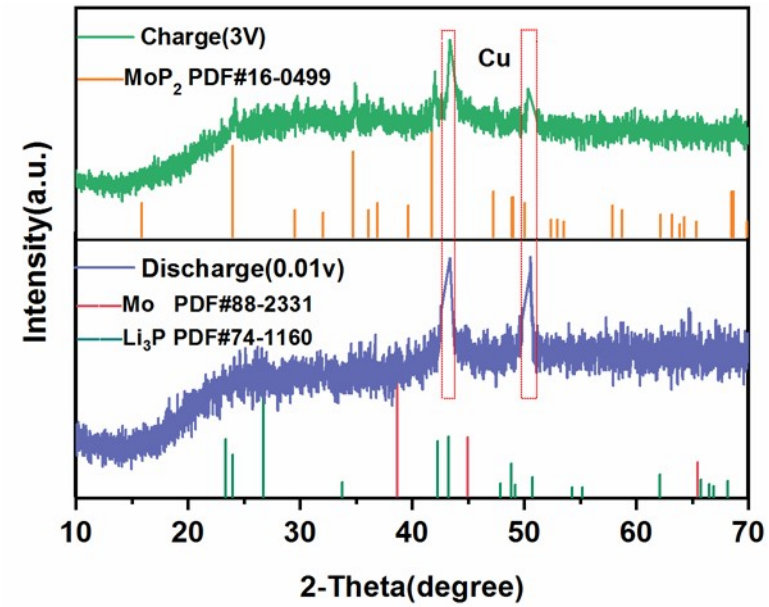

Fig.S4 XRD patterns after cycling.

As shown in the **Fig.S4**, the XRD diffraction peaks of Mo (**PDF#88-2331**) and Li_3P (**PDF#74-1160**) appear in the discharge process along with the disappearance of the principal diffraction peak of MoP_2, which confirms that Mo and Li_3P are generated through the electrochemical reaction between the electrode material and Li. During the charging process, the XRD diffraction peaks of MoP_2 (**PDF#16-0499**) show that Li escapes from the electrode material.

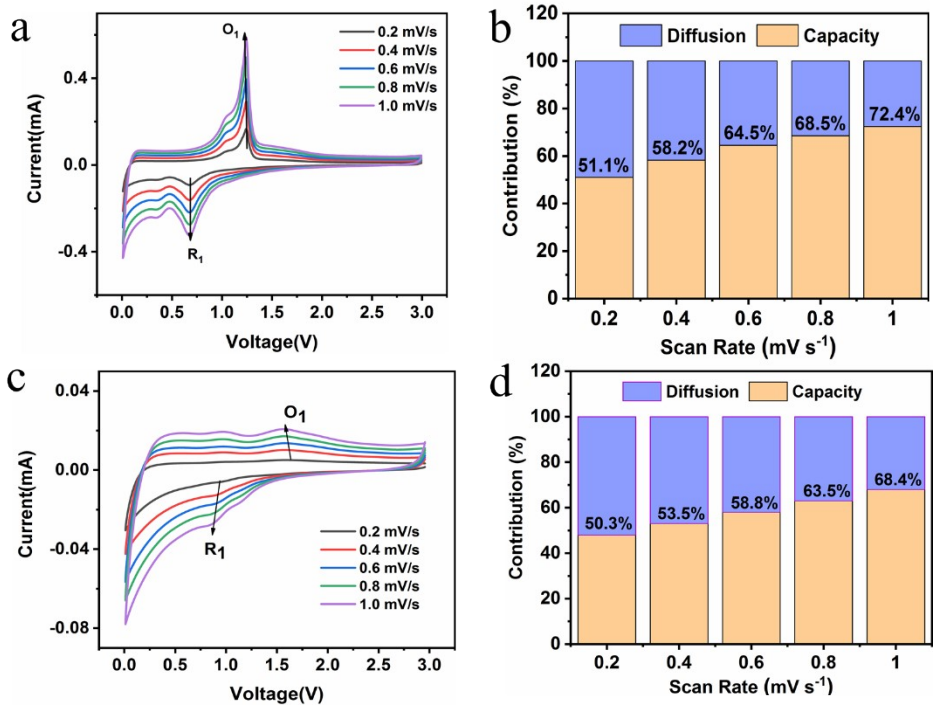

Fig.S5 (a-c) CV curves of MoP_2/C@PPy and MoP_2/C (0.2 to 1.0 mV s^{-1}) and (b-d) the percentage of pseudo capacitive contribution from 0.2 to 1.0 mV/s.