Supporting Information

Monodispersed mesoporous Li$_4$Ti$_5$O$_{12}$ submicrospheres as anode materials for lithium-ion batteries: morphology and electrochemical performances

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Fig. S1. XRD spectra of precursor TiO$_2$ submicrospheres and the samples after the solvothermal process (P-LTO-0 and P-LTO-60).

Fig. S2. FESEM images of (a) P-LTO-30 and (b) LTO-30-500.

The chemical reactions of the solvothermal process and the sintering process in Fig. 2 can be expressed as Eq. (S1) through Eq. (S3).

\[
(1 + x)Li^+ + (2 - y)TiO_2 + (4y + 2\delta)OH^- \xrightarrow{\text{hydrothermal}} Li_{1 + x}Ti_{2 - y}O_{4 + \delta} + (2y + \delta)H_2O \tag{S1}
\]

\[
Li_{1 + x}Ti_{2 - y}O_{4 + \delta} \xrightarrow{\Delta} \frac{3 - x - 2y}{6}Li_4Ti_5O_{12} + \frac{3 + 5x + 4y}{6}Li_2TiO_3 \quad (5x + 4y > 3) \tag{S2}
\]

\[
Li_{1 + x}Ti_{2 - y}O_{4 + \delta} \xrightarrow{\Delta} \frac{1 + x}{4}Li_4Ti_5O_{12} + \frac{3 - 5x - 4y}{4}TiO_2 \quad (5x + 4y < 3) \tag{S3}
\]
\[(1 + x - 4y = 2\delta)\]

Li\(^+\) ion diffusion coefficient \(D\) can be calculated from the EIS plots in the low frequency region based on Eq. S4 and Eq. S5 [7,8].

\[Z' = R_\Omega + R_{ct} + \sigma_w \omega^{-0.5}\]  
\[(S4)\]

\[D = \frac{R^2 T^2}{(2A^2 F^4 \sigma_w^2 C_{Li^+}^2)}\]  
\[(S5)\]

where \(Z'\) is the real part of the impedance, \(\sigma_w\), the Warburg impedance coefficient, \(\omega\), the angular frequency, \(R\), the gas constant, \(T\), the absolute temperature, \(A\), the surface area, \(F\), the Faraday’s constant, and \(C_{Li^+}\), the molar concentration of Li\(^+\) ions.