SUPPLEMENTARY INFORMATION

Hydrothermal Fabrication of Sn/SnO/SnO_2 Hybrid Nanocomposites as Highly Reliable Anodes for Advanced Lithium-ion Batteries

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The contribution ratios of the pseudo and diffusive behaviors were quantified using **Eq. S1**.

$$i(V) = k_1 v + k_2 v^{1/2} = i_p + i_d \quad (S1)$$

Where:

i is the current, and ν is the scan rate. $i_p = k_1 \nu$ is the current related to the pseudo process, and $i_d = k_2 \nu^{1/2}$ is the current related to the diffusive process.

At any potential V_x, **Eq. S1** can be rewritten as:

$$\begin{pmatrix} y_{1x} \\ y_{2x} \\ y_{3x} \\ y_{4x} \\ y_{5x} \end{pmatrix} = \begin{pmatrix} \nu_1 & \nu_1^{1/2} \\ \nu_2 & \nu_2^{1/2} \\ \nu_3 & \nu_3^{1/2} \\ \nu_4 & \nu_4^{1/2} \\ \nu_5 & \nu_5^{1/2} \end{pmatrix} \cdot \begin{pmatrix} k_{1x} \\ k_{2x} \end{pmatrix} \quad (S2)$$

When x ranges from 1 to X, matrix **(S2)** can be rewritten as matrix **(S3)**.

$$\begin{pmatrix} y_{11} & y_{12\ldots..} & y_{1X} \\ y_{21} & y_{22\ldots..} & y_{2X} \\ y_{31} & y_{32\ldots..} & y_{3X} \\ y_{41} & y_{42\ldots..} & y_{4X} \\ y_{51} & y_{52\ldots..} & y_{5X} \end{pmatrix} = \begin{pmatrix} \nu_1 & \nu_1^{1/2} \\ \nu_2 & \nu_2^{1/2} \\ \nu_3 & \nu_3^{1/2} \\ \nu_4 & \nu_4^{1/2} \\ \nu_5 & \nu_5^{1/2} \end{pmatrix} \cdot \begin{pmatrix} k_{11} & k_{12\ldots..} & k_{1X} \\ k_{21} & k_{22\ldots..} & k_{2X} \end{pmatrix} \quad (S3)$$

$$Contribution\ of\ pseudo\ (\%) = \frac{Areas\ of\ pseudo\ curve}{Areas\ of\ pseudo\ curve\ +\ Areas\ of\ diffusive\ curve}\ x\ 100 \quad (S4)$$

$$Contribution\ of\ diffusive\ (\%) = \frac{Areas\ of\ diffusive\ curve}{Areas\ of\ pseudo\ curve\ +\ Areas\ of\ diffusive\ curve} x\ 100 \quad (S5)$$

The values of k_{1x} and k_{2x} at each V_x were calculated by solving matrix **(S3)**. The curves of the pseudo and diffusive behaviors were drawn based on i_p and i_d at each V_x using **Eq. S1**. The areas of the pseudo and diffusive curves at each scan rate were determined using *Simpson's integration* method to calculate the pseudo and diffusive contributions to the total process, as shown in **Eq. S4** and **Eq. S5**.

Fig. S1. The change of pH value before and after hydrothermal process for all samples.

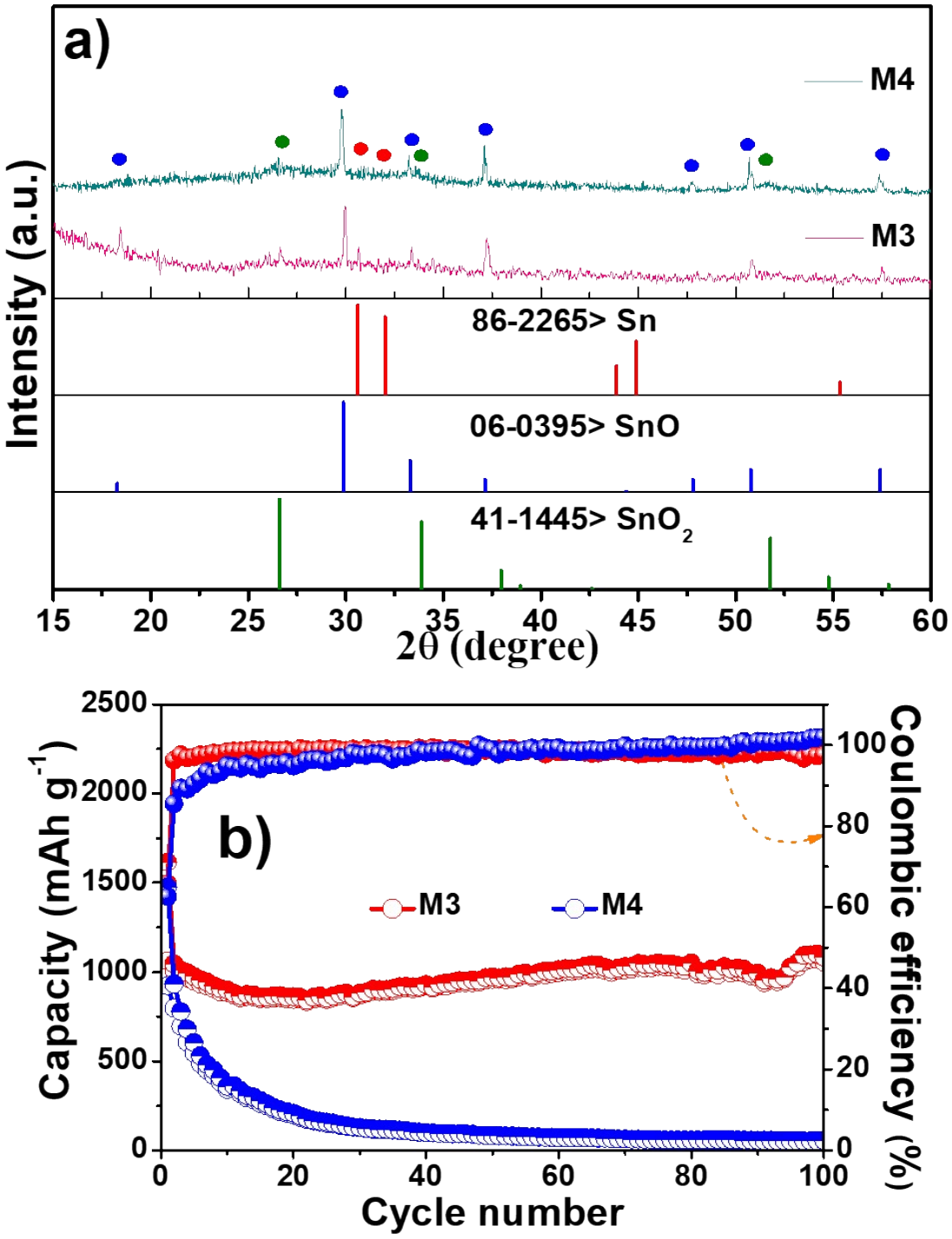

Fig. S2. (a) Powder XRD pattern of M3 and M4 samples and the reference peaks of Sn, SnO, and SnO_2. (b) Cycling performances of M3 and M4 electrode.

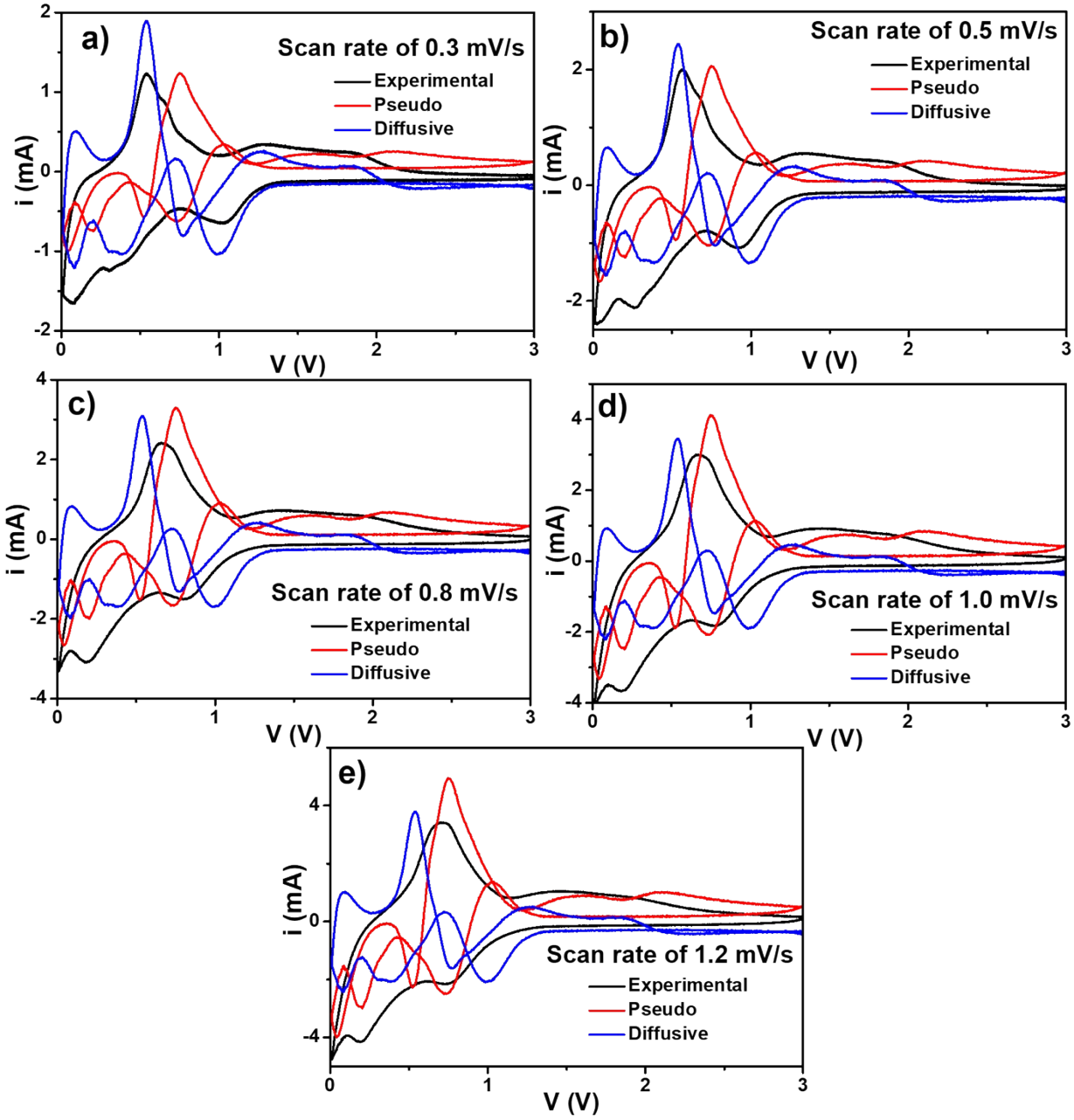

Fig. S3. (a–e) details of pseudo and diffusive curves at various scan rates of M1 electrode.

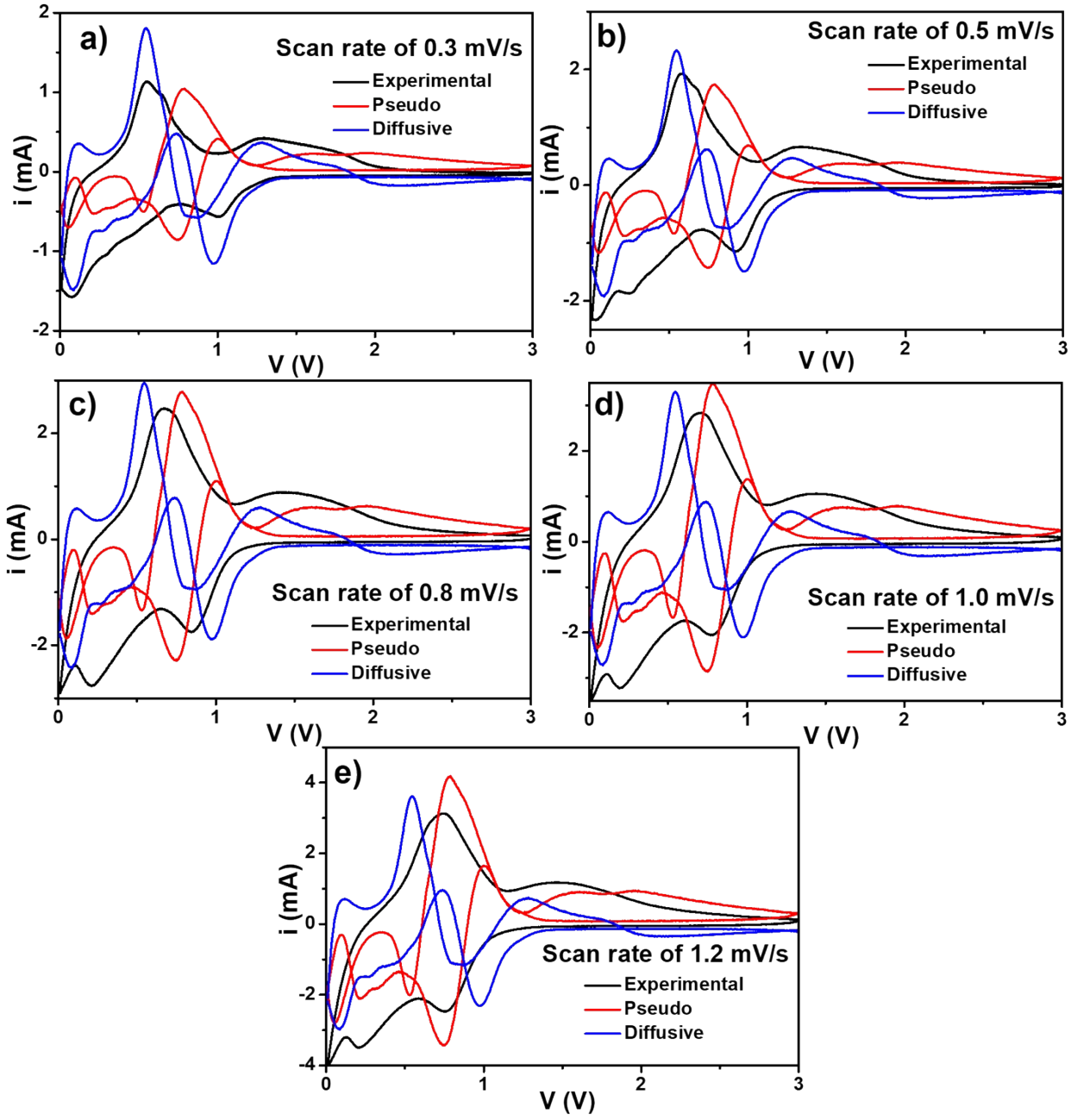

Fig. S4. (a–e) details of pseudo and diffusive curves at various scan rates of M2 electrode.

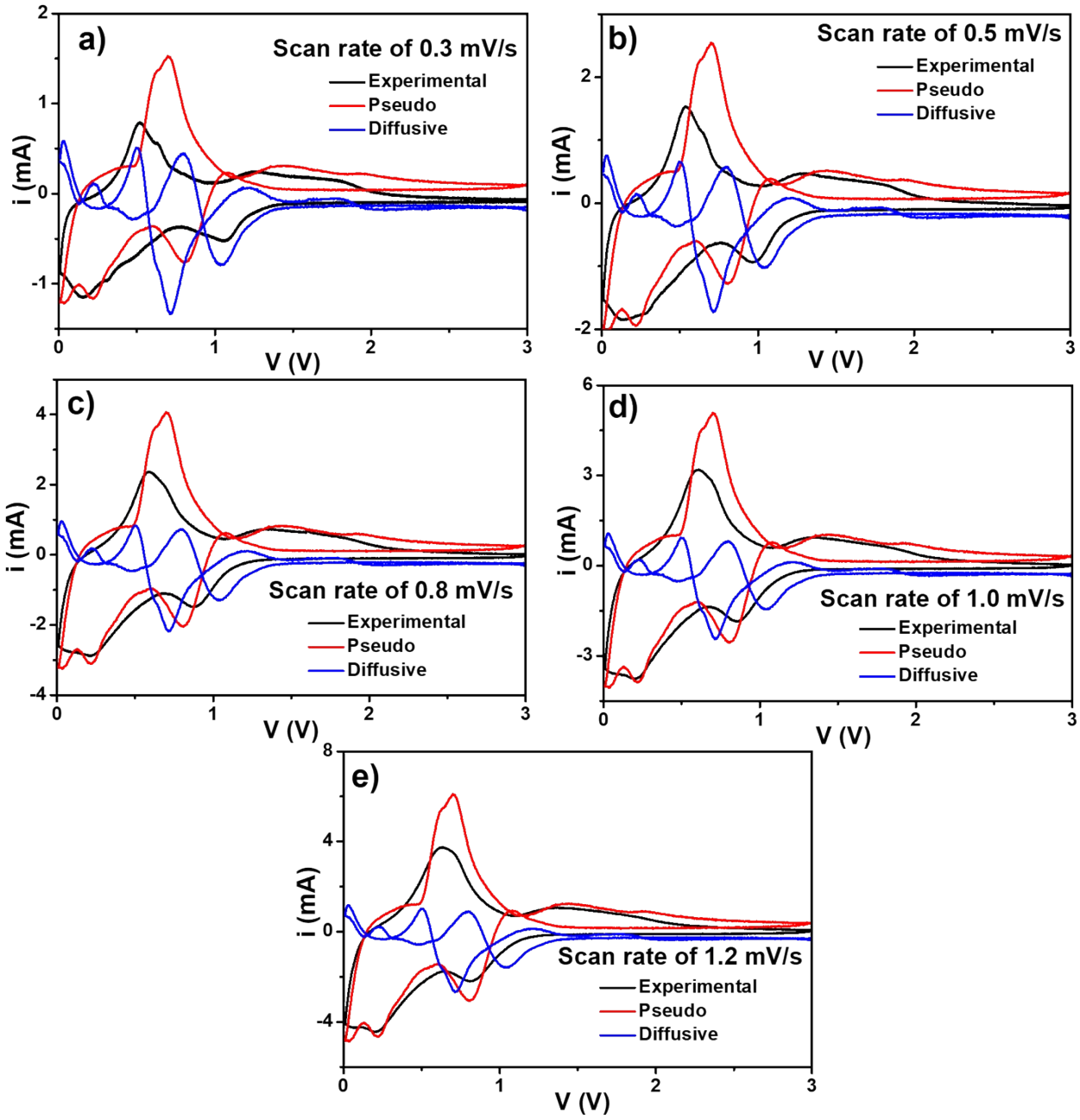

Fig. S5. (a–e) details of pseudo and diffusive curves at various scan rates of M3 electrode.

Table S1. EDS results for the prepared samples.

	% Atom
M1	Sn : O = 21.99 : 78.01
M2	Sn : O = 26.13 : 73.87
M3	Sn : O = 26.66 : 73.34

Table S2. EIS results for the prepared electrodes.

	M1	**M2**	**M3**
R_S (Ω)	2.46	6.74	2.42
R_{SEI} (Ω)	2.10	1.56	1.63
R_{CT} (Ω)	16.35	4.50	3.15