## **Supporting Information**



**Figure S1.** (a) CV curves of the composite with 20% PCL contents collected at different scan rates; (b) galvanostatic charge/discharge curves of MCP20S80 electrode film; (c) areal capacitances of MCP20S80 electrode film at different current density.

Figure S1(a) displays the CV curves of the MCP20S80 supercapacitors recorded with different sweep rates. The galvanostatic charge-discharge curves of the MCP20S80 supercapacitors at various current densities (0.2-1 mA cm<sup>-2</sup>) are shown in Figure S1(b). Based on the galvanostatic charge-discharge curves, the areal capacitances (Figure S1(c)) of the supercapacitors were calculated and plotted as a function of current densities.



**Figure S2.** (a) CV curves of the composite with 60% PCL contents collected at different scan rates; (b) galvanostatic charge/discharge curves of MCP60S40 electrode film; (c) areal capacitances of MCP60S40 electrode film at different current density.

Figure S2(a) displays the CV curves of the MCP60S40 supercapacitors recorded with different sweep rates. The galvanostatic charge-discharge curves of the MCP60S40 supercapacitors at various current densities (0.2-1 mA cm<sup>-2</sup>) are shown in Figure S2(b). Based on the galvanostatic charge-discharge curves, the areal capacitances (Figure S2(c)) of the supercapacitors were calculated and plotted as a function of current densities.



**Figure S3.** (a) CV curves of the MCP20S80 at different states collected at 5 mV s<sup>-1</sup>; (b) galvanostatic charge/discharge curves of MCP20S80 electrode film at different states collected at  $0.2 \text{ mA cm}^{-2}$ .

In order to disclose the thermal-triggered self-healing of the capacitors, CV measurements were performed. Figure S3(a) shows the CV measurements of the MCP20S80 in three states were obtained at a scan rate of 5 mV s<sup>-1</sup>. The galvanostatic charge-discharge measurements were executed at a current density of 0.2 mA cm<sup>-2</sup>, which are shown in Figure S3(b).



**Figure S4.** (a) CV curves of the MCP60S40 at different states collected at 5 mV s<sup>-1</sup>; (b) galvanostatic charge/discharge curves of MCP60S40 electrode film at different states collected at  $0.2 \text{ mA cm}^{-2}$ .

In order to disclose the thermal-triggered self-healing of the capacitors, CV measurements were performed. Figure S4(a) shows the CV measurements of the MCP60S40 in three states were obtained at a scan rate of 5 mV s<sup>-1</sup>. The galvanostatic charge-discharge measurements were executed at a current density of 0.2 mA cm<sup>-2</sup>, which are shown in Figure S4(b).