1 [Supporting information]

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3	Tunable fabrication of core-shell Ni-MnO <sub>2</sub> hybrid foams through
4	structure-guided combustion waves for binder-free high-
5	performance supercapacitor electrodes
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17	Keywords: structure guided combustion wave, organic shell, carbon shell, redox reaction,
18	MnO <sub>2</sub> , supercapacitor, carbon film, combustion synthesis, amorphous carbon
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2 Fig. S1 Atomic percent of carbon (C) as a function of the application number of SGCWs.

3 Variation in the carbon atomic percent of the carbon-coated Ni foams as a function of the

4 number of SGCW applications. The carbon atomic percent was measured by XPS analysis.









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2 Fig. S3 MnO<sub>2</sub> formation depending on the mass ratio of KMnO<sub>4</sub> and NH<sub>4</sub>OH. Substituted

3 mass from carbon templates to MnO<sub>2</sub> coatings on Ni foams upon immersion in a KMnO<sub>4</sub>
4 solution with different NH<sub>4</sub>OH concentrations.

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8 Fig. S4. EDS mapping of the three-times SGCW-applied core-shell Ni-MnO<sub>2</sub> foams. (a)

9 SEM images of the core-shell Ni-MnO<sub>2</sub> foams and their (b) Mn, (c) O, (d) Ni, and (e) C





Fig. S5 Electrochemical impedance spectroscopy (EIS) measurements in different volume
ratios of KMnO<sub>4</sub> and NH<sub>4</sub>OH. Nyquist plots of the core-shell Ni-MnO<sub>2</sub> foams fabricated by
using a KMnO<sub>4</sub> solution with different NH<sub>4</sub>OH concentrations.





Fig. S6 Electrochemical performance of the core-shell Ni-MnO<sub>2</sub> foams, fabricated by the
direct attachment of MnO<sub>2</sub> without applying SGCWs, and with one- and two-times
SGCWs. (a) Specific capacitances at various scan rates of 1, 2, 5, 10, 20, 50, 100, 200, and
500 mV/s. (b) EIS results. (c) Capacitance retention.



2 Fig. S7 Galvanostatic charge-discharge performance and capacitance retention of three-

- 3 times SGCW-applied core-shell Ni@MnO<sub>2</sub> foams at a current density of 5 A/g.
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7 Fig. S8 SEM image of the surface of the three-times SGCW-applied core-shell Ni@MnO<sub>2</sub>

- 8 foams.
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Fig. S9 Ragone plots of the specific energy and power density of supercapacitors using
the three-times SGCW-applied core-shell Ni@MnO<sub>2</sub>-based binder-free supercapacitor
electrodes with different MnO<sub>2</sub>-based electrodes.<sup>1-4</sup> The specific energy and power density
of this work were obtained from the half-cell using the Ni@MnO<sub>2</sub>-based binder-free
supercapacitor electrode.

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