Supporting Information

Tuning the Surface Charge Density of Exfoliated Thin Molybdenum Disulfide Sheets via Non-Covalent Functionalization for Promoting Hydrogen Evolution Reaction

Wei-Ming Huang, a Wei-Sheng Liao, a Yan-Ming Lai, a I-Wen Peter Chen* a
Dr. I-W. P. Chen, W.-M. Huang
Department of Applied Science, National Taitung University, Taitung City (95092), Taiwan
E-mail: iwchen@nttu.edu.tw
Figure S1. Characteristic peaks of Raman spectra for bulk MoS$_2$. 
Figure S2. a) LSV and b) Tafel plots of Pt and bulk-MoS$_2$. 
Figure S3. Chronoamperometric response recorded from the py-MoS$_2$, im-MoS$_2$, and ch-MoS$_2$ electrode at a constant potential of -400 mV, -300 mV, and -200 mV, respectively.
Figure S4. Cyclic voltammetry curves in the region of 0.1 ~ 0.2 V vs. RHE for a) py-MoS$_2$, b) im-MoS$_2$, c) ch-MoS$_2$. d) Capacitive currents at 150 mV as a function of scan rate for py-MoS$_2$, im-MoS$_2$, and ch-MoS$_2$. 
Figure S5. Electrical conductivity of 2 cm (width) x 2cm (length) ch-MoS$_2$/CNTs paper (thickness: 20 $\mu$m).
Figure S6. SEM images of the ch-MoS$_2$/PtNPs/CNTs. a) Low and b)-c) High magnification. d) Thickness measurement of the ch-MoS$_2$/PtNPs/CNTs paper electrode (unit: mm). e) Photograph of the ch-MoS$_2$/PtNPs/CNTs.
Figure S7. Electrical conductivity of ch-MoS$_2$/PtNPs/CNTs paper.
Figure S8. EDS mapping images of a) Mo, b) S, c) Pt, and d) C of the ch-MoS$_2$/PtNPs/CNTs paper.
Figure S9. a) N\textsubscript{2} adsorption/desorption isotherms and b) pore size distribution of ch-MoS\textsubscript{2}/CNTs. c) N\textsubscript{2} adsorption/desorption isotherms and d) pore size distribution of ch-MoS\textsubscript{2}/PtNPs/CNTs.
Figure S10. a) LSV, b) Tafel slope, c)-d) HER stability measurements for the flexible ch-MoS$_2$/PtNPs/CNTs electrode.
Figure S11. Electrochemical impedance spectroscopy (EIS) curves of ch-MoS$_2$/PtNPs/CNTs and bulk MoS$_2$. 
Table S1. EDS analysis of the ch-MoS$_2$/PtNPs/SWCNT paper.

<table>
<thead>
<tr>
<th>Element</th>
<th>Atom (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum</td>
<td>0.52</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>3.54</td>
</tr>
<tr>
<td>Sulfur</td>
<td>6.86</td>
</tr>
<tr>
<td>Carbon</td>
<td>86.12</td>
</tr>
<tr>
<td>Oxygen</td>
<td>2.93</td>
</tr>
</tbody>
</table>