Electrochemical investigation of uncapped AgBiS$_2$ (Schapbachite) synthesized by *in situ* melts of xanthate precursors

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Supplementary Data
Figure S1. TGA and heat flow curves for (a) $(O$-ethyldithiocarbonato)silver(I) and (b) $tris(O$-ethyldithiocarbonato)bismuth(III) complex.

Figure S2  (i) p-XRD pattern of monoclinic $Ag_2S$ (acanthite, ICDD # 00-024-0715) synthesized by pyrolysis of $(O$-ethyldithiocarbonato)silver(I) complex at (a) 200 °C, (b) 250 °C and (c) 300 °C. (ii) p-XRD pattern of orthorhombic $Bi_2S_3$ (bismuthinite, ICDD# 01-075-1306) synthesized by pyrolysis of $tris(O$-ethyldithiocarbonato)bismuth(III) complex at (a) 200 °C, (b) 250 °C and (c) 300 °C.
Figure S3. p-XRD of (a) silver ethyl xanthate and (b) bismuth ethyl xanthate, complexes.

Figure S4. p-XRD pattern of cubic AgBiS$_2$ (schapbachite) synthesized at (a) 200 °C, (b) 250 °C and (c) 300 °C by melt method.
Figure S5. p-XRD pattern of AgBiS$_2$ synthesized at 150 °C, where (*) represent the peaks for matildite phase and (#) represent schapbachite phase.

Figure S6. EDX spectrum of AgBiS$_2$ synthesized at 250 °C.
Figure S7. Raman spectrum of AgBiS$_2$ synthesized at 250 °C.

Figure S8. UV-Vis-NIR spectrum of AgBiS$_2$ and (inset) shows estimated band gap by Tauc plot.
Figure S9. (a) $Z_{\text{real}}$ vs. $Z_{\text{img}}$ plot and (b) $|Z|$ vs. frequency plot for AgBiS$_2$. 
Table S1. Comparison of specific capacitance of other reported oxide and sulfide-based materials.

<table>
<thead>
<tr>
<th>Samples</th>
<th>Specific capacitance (F/g)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi$_2$S$_3$-Graphene composite</td>
<td>290</td>
<td>1</td>
</tr>
<tr>
<td>Microwave-assisted CoS</td>
<td>224</td>
<td>2</td>
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<tr>
<td>CoS</td>
<td>~435</td>
<td>3</td>
</tr>
<tr>
<td>CuCo$_2$O$_4$</td>
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<td>4</td>
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<tr>
<td>CuCo$_2$S$_4$</td>
<td>443</td>
<td>5</td>
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<tr>
<td>NiCo$_2$O$_4$ films on ITO</td>
<td>490</td>
<td>6</td>
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<tr>
<td>NiCo$_2$O$_4$ coral-like porous crystals</td>
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<td>7</td>
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<tr>
<td>NiCo$_2$S$_4$</td>
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<td>8</td>
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<tr>
<td>NiCo$_2$S$_4$/Fe$_2$O$_3$</td>
<td>342</td>
<td>9</td>
</tr>
<tr>
<td>AgBiS$_2$</td>
<td>440</td>
<td>This work</td>
</tr>
</tbody>
</table>

1. Reference 1
2. Reference 2
3. Reference 3
4. Reference 4
5. Reference 5
6. Reference 6
7. Reference 7
8. Reference 8
9. Reference 9


