**SUPPLEMENTARY DATA**

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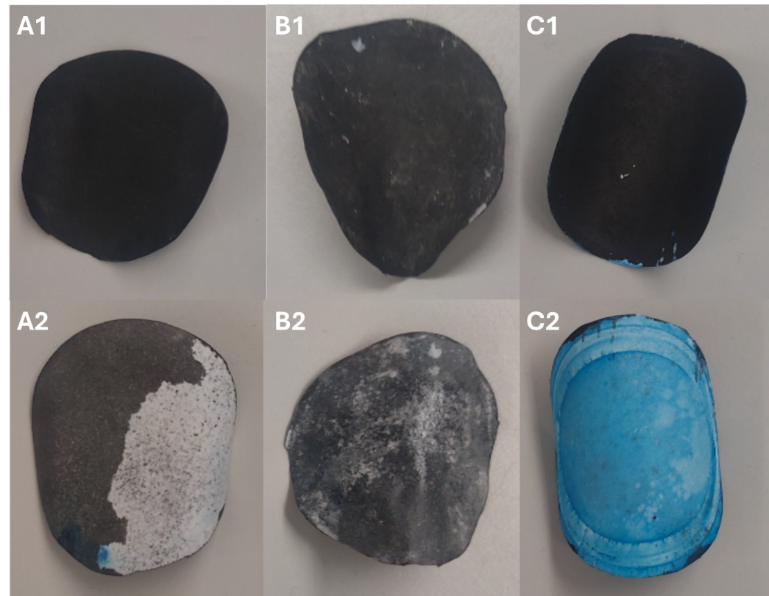
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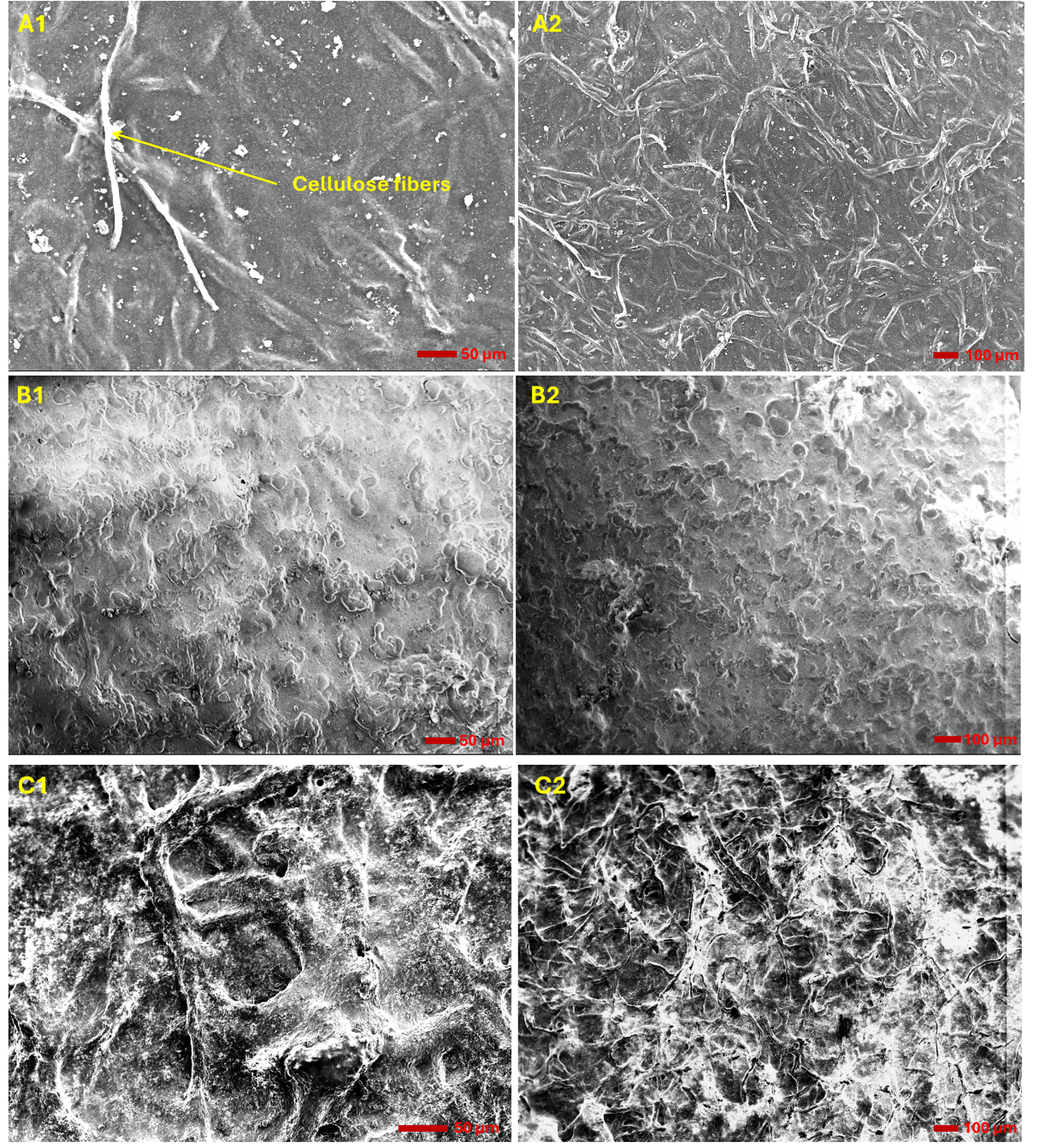
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**Figure S1** CS, PVA, and CS/PVA membranes after the electrochemical experiments. (A1, B1, C1) are ink-coated side of CS, PVA, and CS/PVA membranes and (A2, B2, C2) are uncoated side of CS, PVA, and CS/PVA membranes

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**Figure S2** SEM images of CS, PVA, and CS/PVA membranes after coating with graphene ink. Panels (A1, A2), (B1, B2), and (C1, C2) depict the surface morphologies of the CS, PVA, and CS/PVA membranes.

A graph of different colored lines

AI-generated content may be incorrect.

**Figure S3** Electrochemical impedance spectroscopy (EIS diagram) of CS, PVA and CS/PVA membranes. A - uncoated samples, B - ink coated samples (0.01V amplitude and 0.01 Hz frequency)

**Table S1** Youngs modulus, tensile strength and elongation at break values of CS, PVA, and CS/PVA membranes

|  |  |  |  |
| --- | --- | --- | --- |
| **Membrane** | **Young’s modulus (MPa)** | **Tensile strength (MPa)** | **Elongation at break (%)** |
| CS | 0.38 ± 0.23 | 1.28 ± 0.29 | 6.46 ± 2.47 |
| PVA | 0.07 ± 0.01 | 0.58 ± 0.04 | 11.43 ± 1.14 |
| CS/PVA | 0.33 ± 0.08 | 3.73 ± 1.30 | 12.22 ± 0.29 |