

EMBROIDER POWER

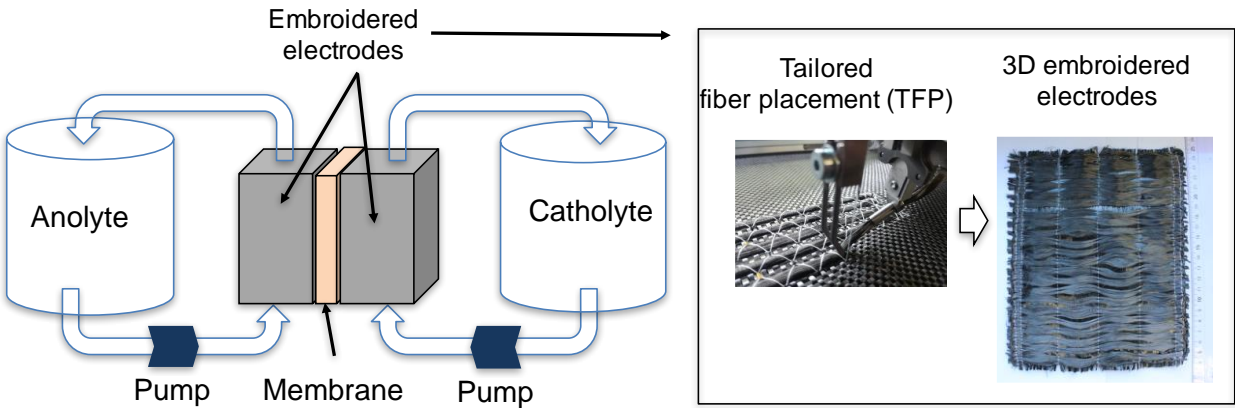


Fig. 1. Three-dimensional (3D) electrodes created with embroidery for RFB.

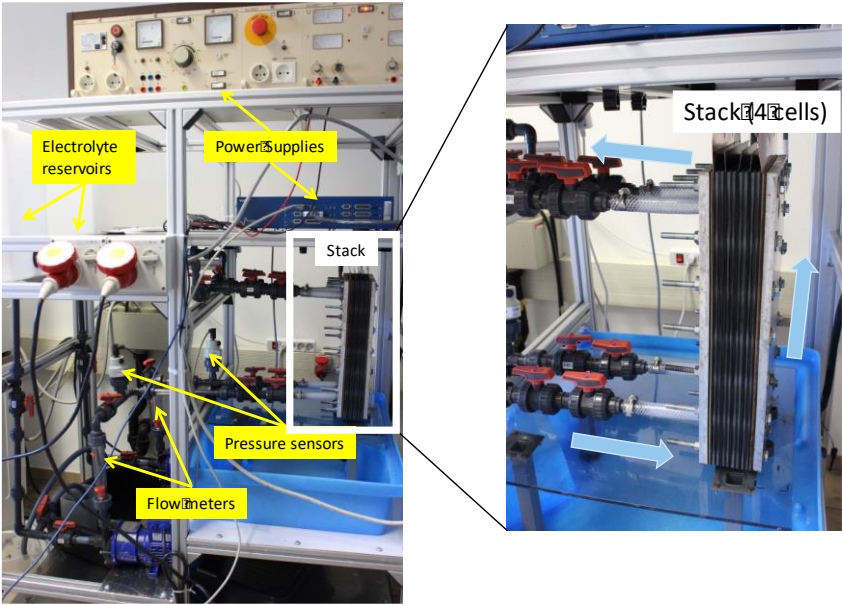


Fig. 2. Picture of the final flow battery stack prototype.

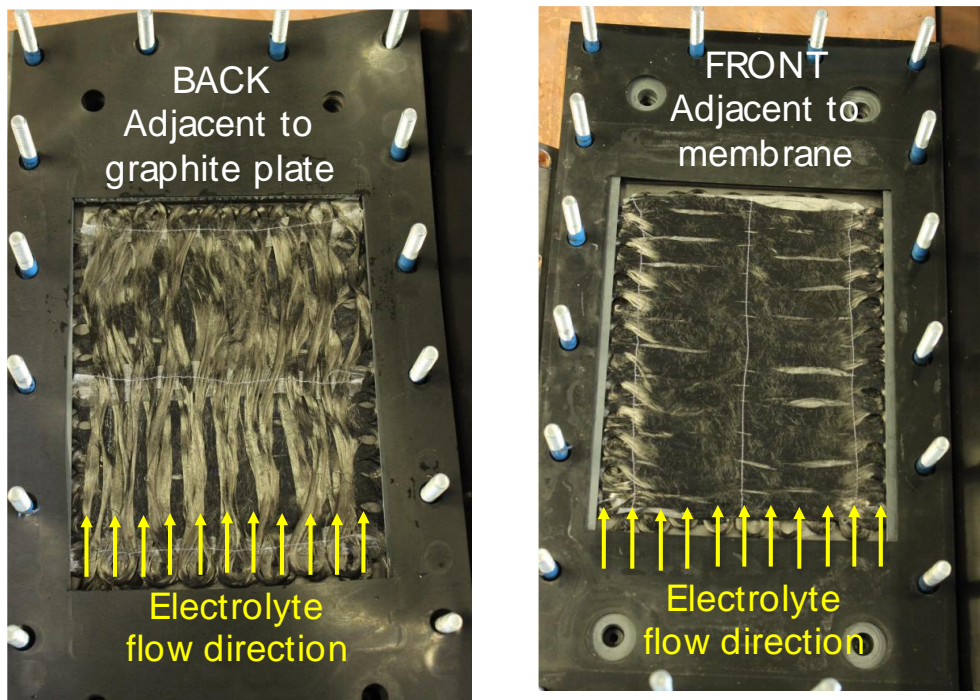


Fig. 3. Example of an embroidered electrode inside a cell. The carbon filaments parallel to the electrolyte flow allow minimizing the hydraulic resistance, while filaments perpendicular to the flow allow for an enhancement of the mass transfer coefficient.

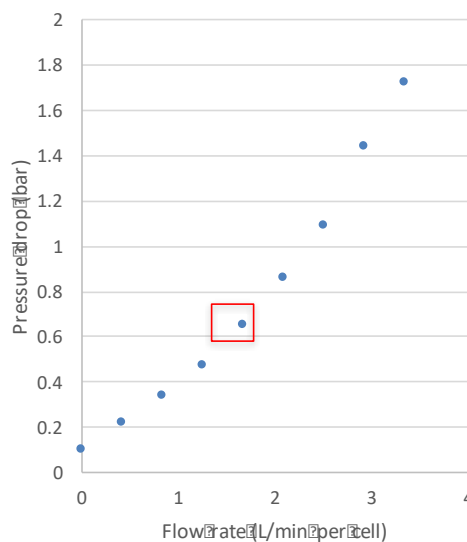


Fig. 4. Pressure drop of a 4-cell stack versus the flow rate per cell in a vanadium redox flow battery. The optimized flow rate was established at 1.67 L/min per cell (6.68 L/min per stack) with a pressure drop of 0.6 bar following the same trend as the single cell, which corresponds to 4 times greater flow rates than commercial battery systems at similar pressure drops (<0.65 bar).

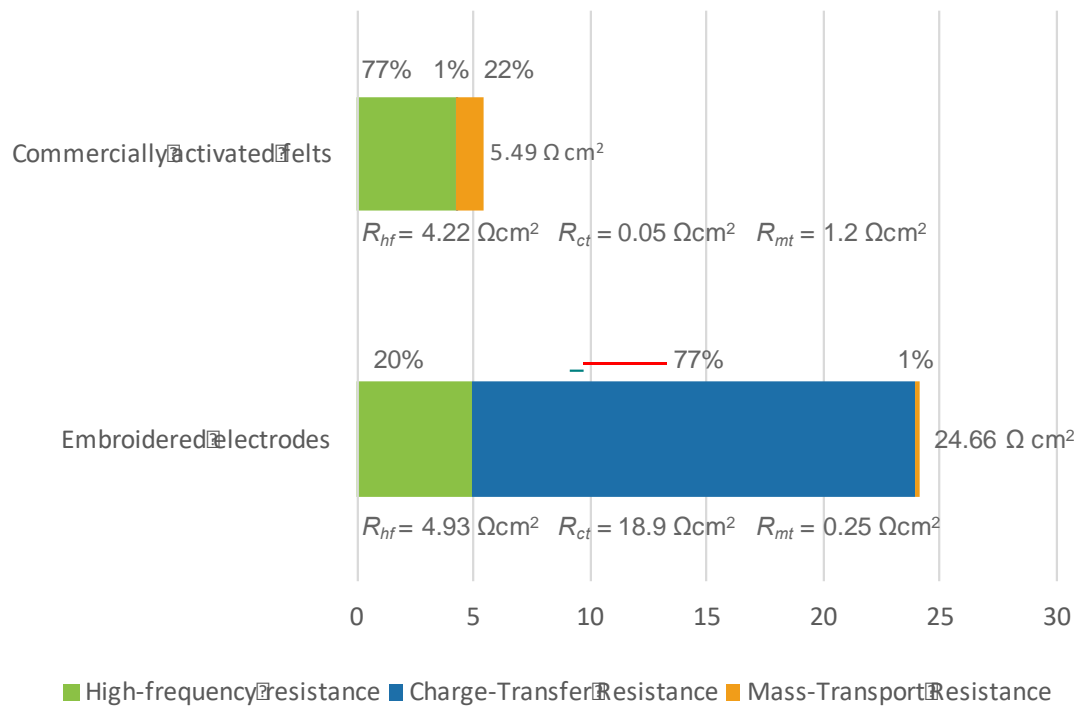


Fig. 5. Resistance contributions of the embroidered electrodes in comparison to commercial activated felts obtained with the commercial vanadium electrolyte (geometric electrode areas of 300 cm²).