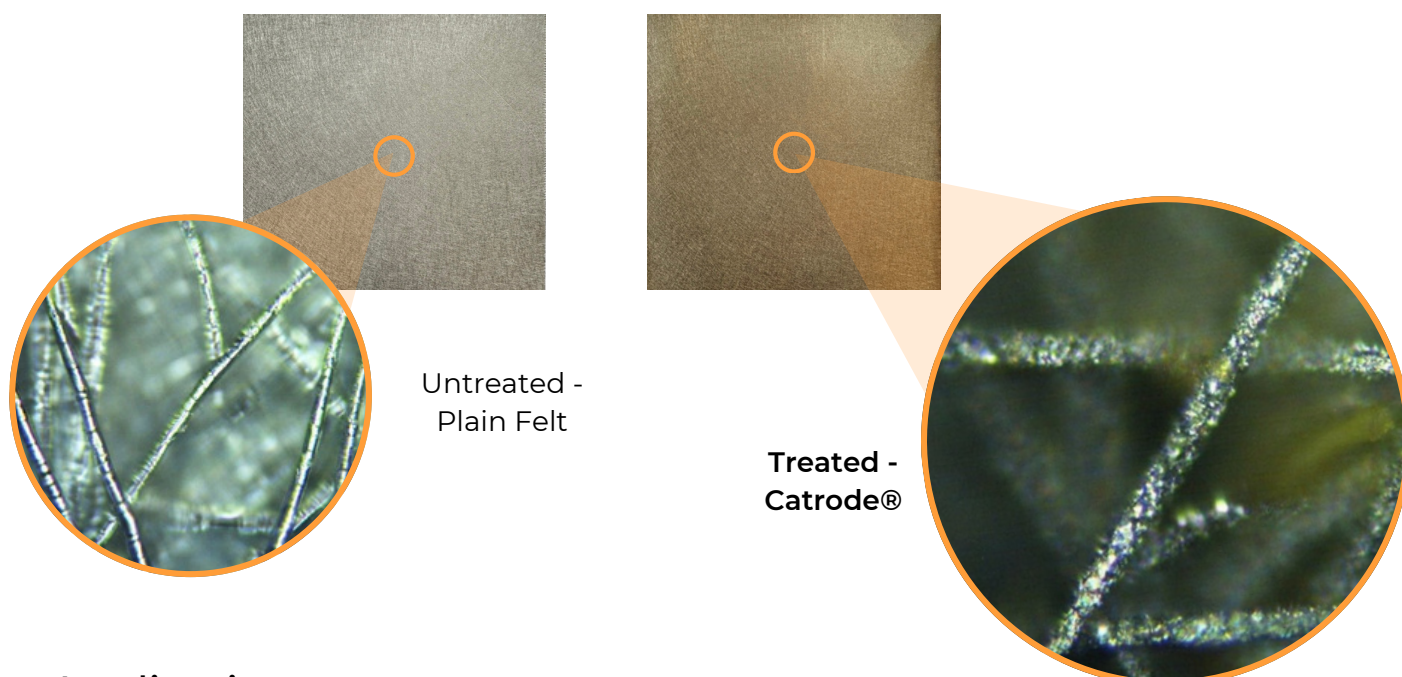


Catrode®

With our innovative electrochemical treatment process, we activate stainless steel electrodes to make Catrodes® which combine both catalyst and electrode as one homogeneous part, without additional ingredients. Catrodes are PGM free (platinum group metal) robust high-performance products for industrial use. The production process is developed for high volume mass production at realistic costs – reducing the capital costs of Green Hydrogen. Our Catrode is a Ni-Fe catalyst. First, the electrochemical surface area is increased then chromium is removed, and nickel is migrated and exposed on the surface of the stainless steel felt to produce a nickel iron catalytic surface layer.



Application

For **alkaline water electrolysis**, either **AEM** or Zero Gap designs. For use with Potassium Hydroxide (KOH) electrolyte in concentrations from 0.1M to 5M.

Our Catrodes were developed to be used as anodes but can also be used as cathodes in an alkaline electrolyser. They are designed to be ran wet i.e. with liquid electrolyte in contact with the Catrode and membrane. Not intended for use with Nafion membranes.

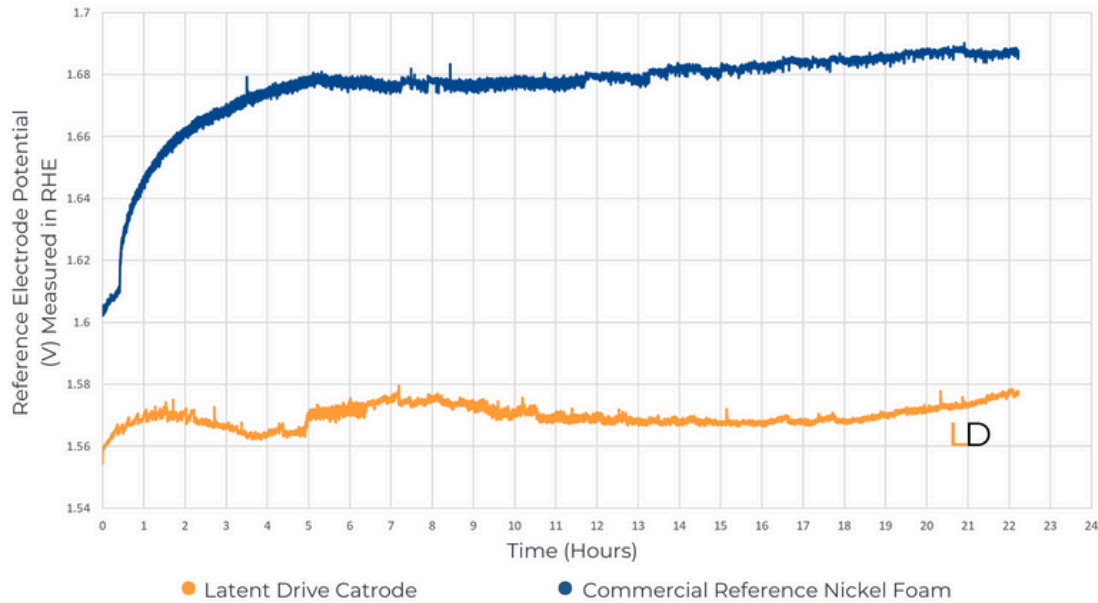
Catrodes may also have potential to be used in batteries and fuel cell technology and we would welcome opportunities to collaborate on research in these areas.

Performance

Our PGM free Catrodes performance in OER is comparable with state-of-the-art precious metal catalysts such as platinum and iridium and significantly surpasses the performance of nickel electrodes at a much-reduced cost.

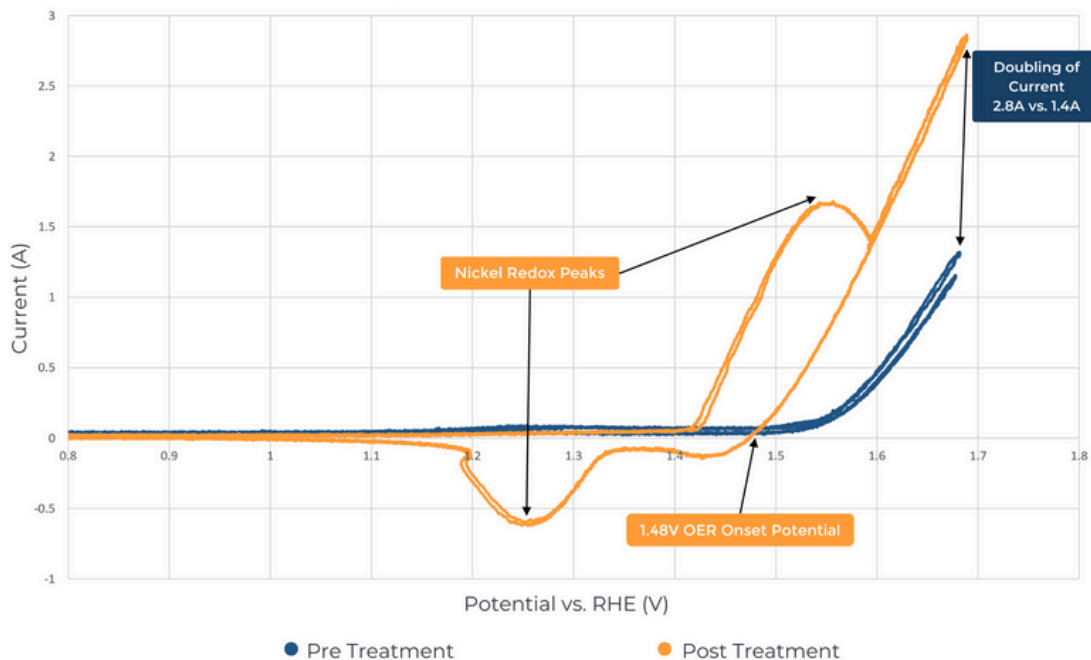
Catrodes exhibited stable performance below 1.58V RHE at 0.2A/cm² at 50°C for 22 hours ran in an ElyFlow test cell with an active area of 10cm² compared to the overpotential of a commercially available Catalysed Nickel foam which reached 1.69V RHE.

Comparison of Catrode Against Commercial Activated Nickel Foam
Chronopotentiometry at 200 mA/cm² 3 molar KOH

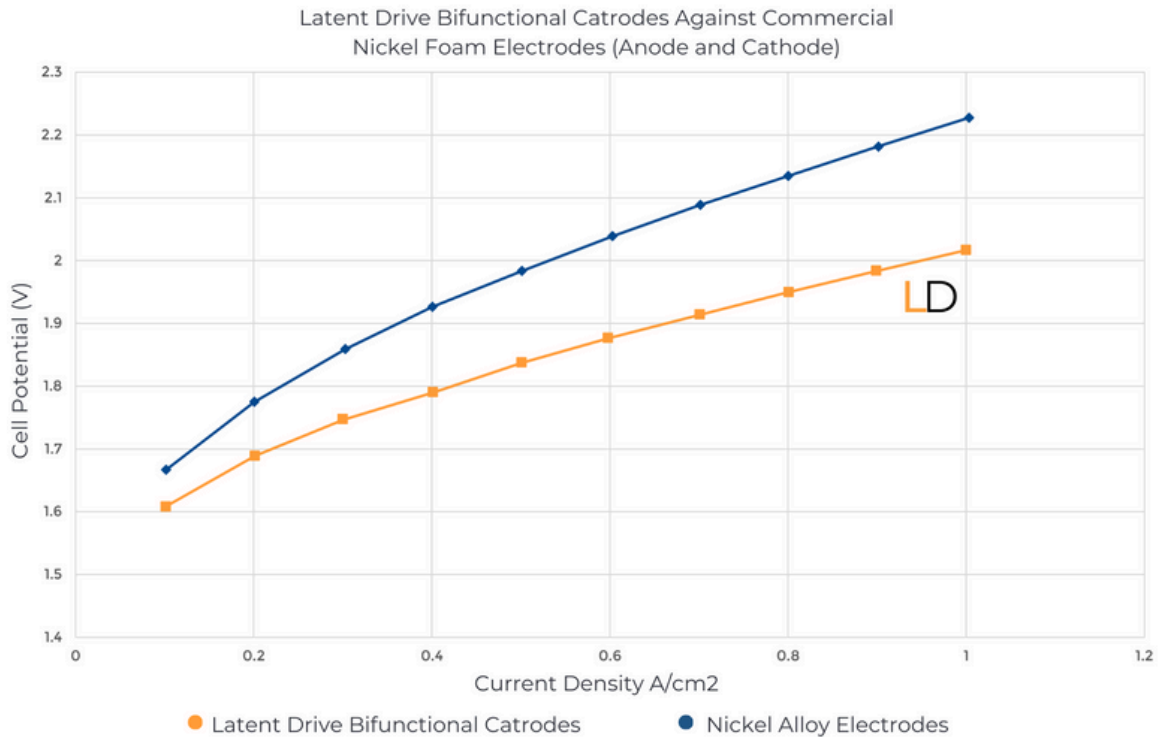


Stability performance comparison against commercially available catalysed nickel foam over 22 hours at 0.2 A/cm².

Cyclic Voltammetry - Pre and Post Treatment
Showing Improved Onset and Nickel Redox Peaks



The cyclic voltammogram shows the redox peaks for the nickel hydroxide to nickel oxyhydroxide reaction - confirming nickel on the surface of the stainless steel. There is also charge stored and released inside these reaction peaks which could be used in battery applications. Note, the doubling of current at the peak of the OER reaction and the reduced onset potential. The treated Catrode takes on a translucent colour.

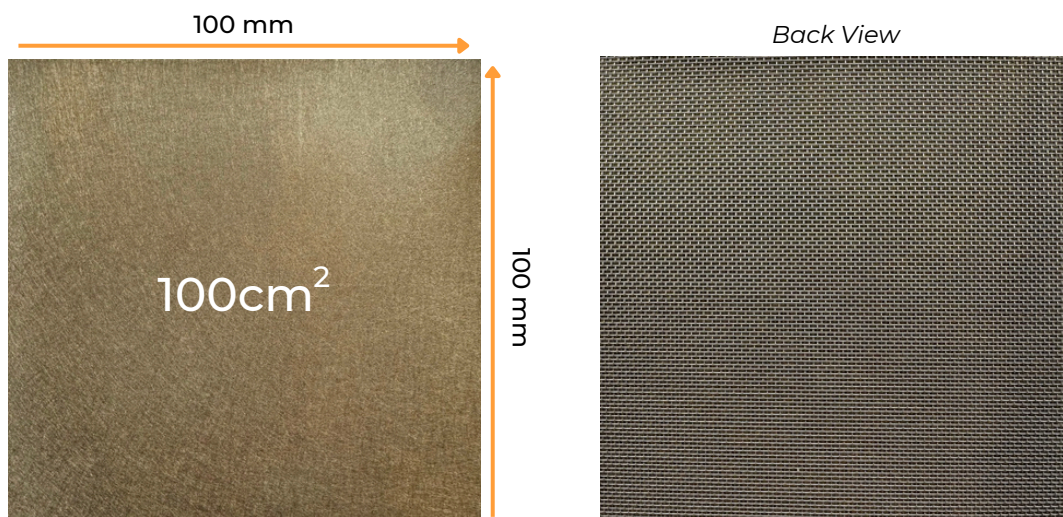


Third party polarization curve of Latent Drive bifunctional catalyst versus a nickel alloy commercial reference.

Our Catrode product was tested in a zero-gap alkaline test cell with Catrode as both anode and cathode and required 2.02 V at 1 A cm² measured from a polarization curve after a break in period of 12 hours where the cell was held at 1 A/cm², surpassing the performance of a commercially available nickel alloy electrode as seen in the polarization curve graph above.

Sizes

Catrodes samples are available in 100 mm x 100 mm (100cm²), in thickness of 0.5mm. Larger sizes available on request.



Cutting Instructions

Best cut using a guillotine with the felt side up and the mesh down. This ensures a burr-free edge that does not damage the membrane. Scissors can be used in a similar manner.

