QSI-Nano® NiFe Product Profile
Hydrogen Generation Electrodes

QUANTUM SPHERE®
CLEAN ENERGY AND POWER FOR ADVANCED APPLICATIONS

Nano NiFe Cathode Electrodes for Water Electrolysis

QSI-Nano® NiFe alkaline water electrolysis electrodes are manufactured using a process in which a blend of highly catalytic QSI-Nano® nickel and iron particles are functionalized by dispersing into a proprietary formulation, spray coated, and sintered onto a stainless steel (SS) substrate. The resulting electrodes have an increased surface area of approximately 1000 times vs. standard SS metal plates and may be used as a drop-in solution for existing alkaline electrolyzers to achieve the following results:

- **Increased Gas Output**
- **Decreased Energy Consumption**
- **Decreased Size While Maintaining Efficiency**

*Prices (Includes Two 16 Gauge 316 SS Electrodes, Nano NiFe Coating on One Side Only)**

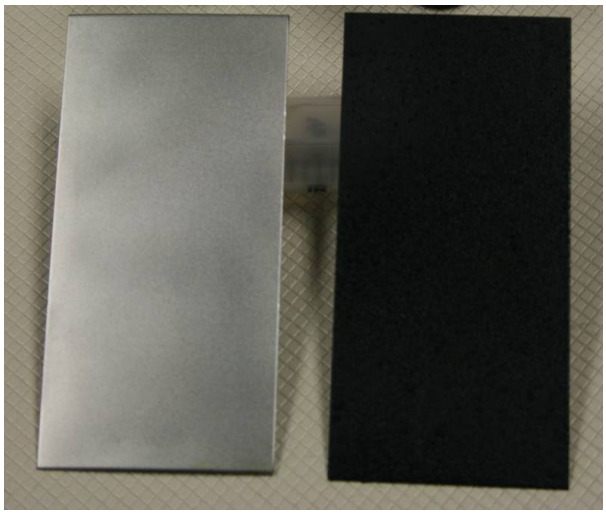
2" x 2"	$ 99.00
4" x 4"	$149.00
6" x 6"	$189.00

*Customization and special pricing available on orders over 100 pieces. Prices subject to change.

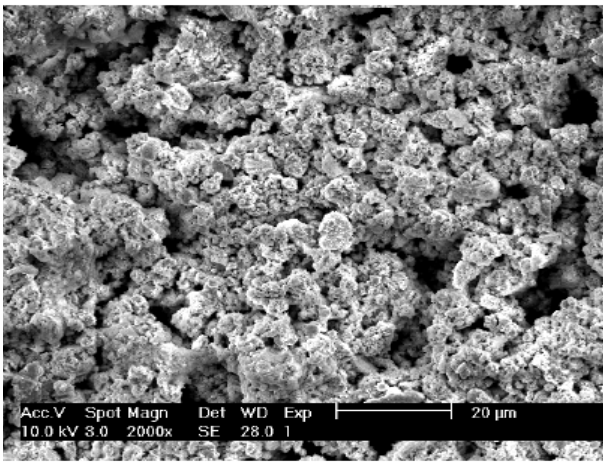
To Place an Order Go To: http://www.qsinano.com/order.php

Note: Typical operating conditions are 80°C, using 33% KOH electrolyte in DI water. Nominally, gas production rates are increased 2 - 3 times the typical values at a given efficiency (higher current at same voltage). The gas output graph below compares SS electrodes (red) vs. a SS anode and QSI-Nano® NiFe coated cathode (blue) in a 20A, six-cell stack with 12V limiting voltage. Performance may vary based on operating conditions and system design.

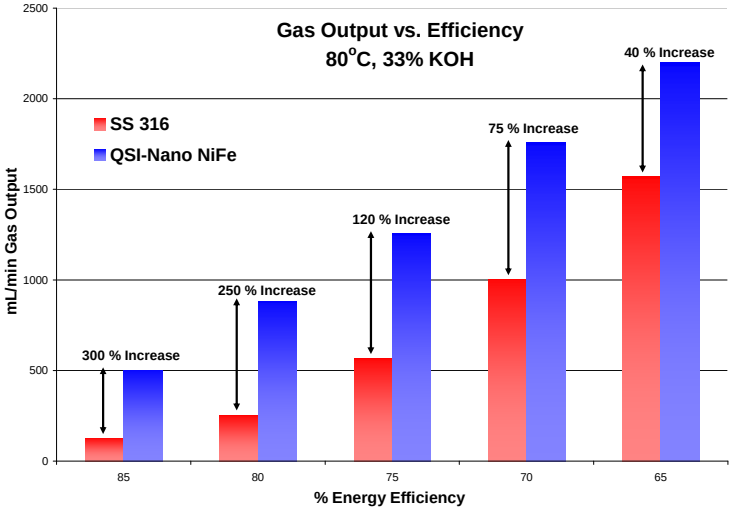
SS Electrode (left), QSI-Nano® NiFe Coated Electrode (right)



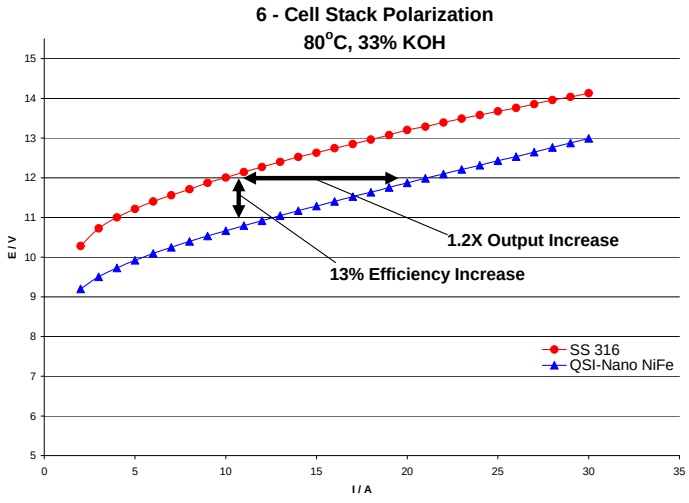
SEM Image of QSI-Nano® NiFe Coated SS Electrode Surface

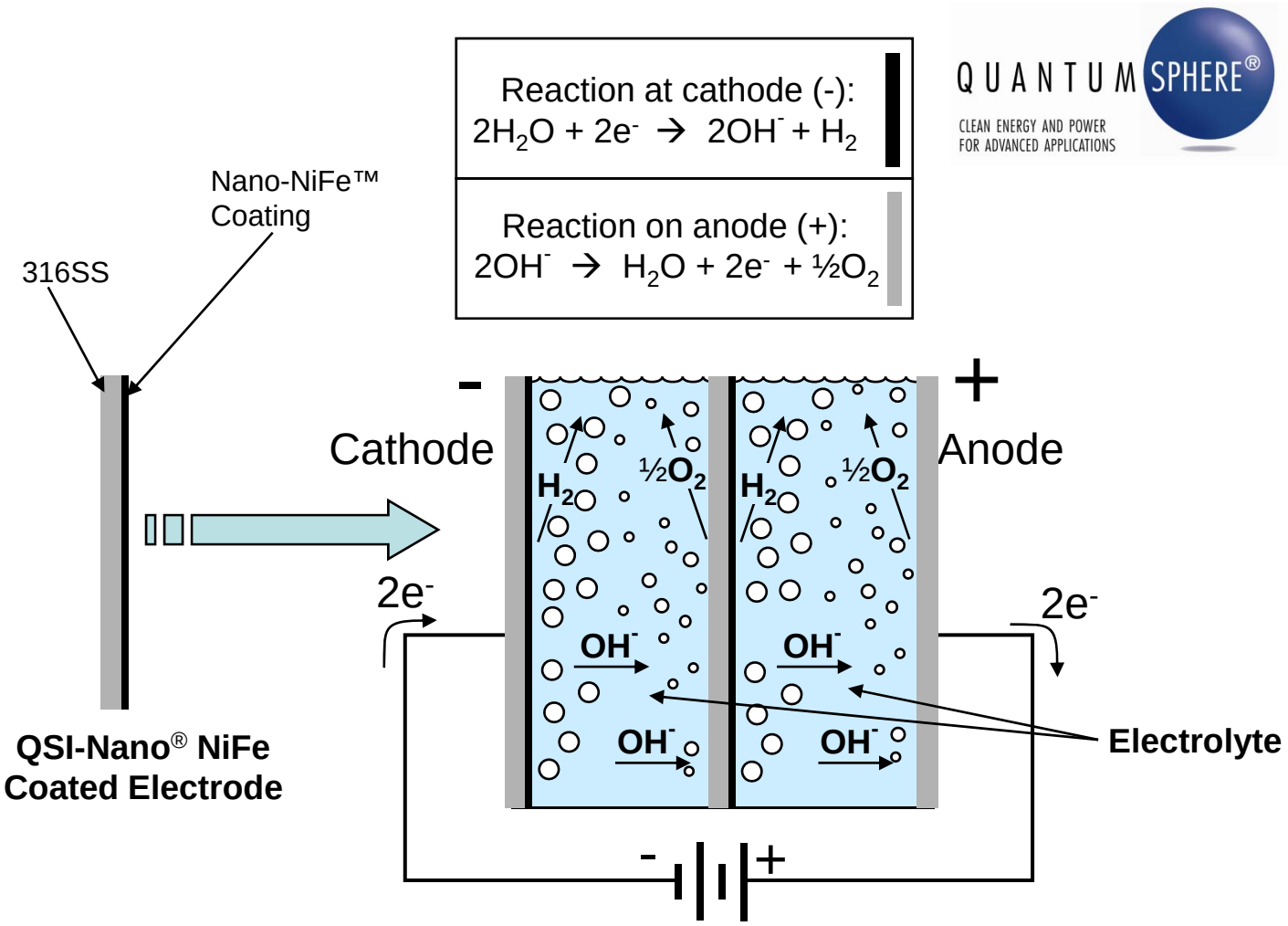


Typical Gas Output Vs. Energy Efficiency



Polarization Curve of SS (red) Vs. QSI-Nano® NiFe Coated SS (blue)





Alkaline Electrolyzer with QSI-Nano® Electrodes - Bipolar Stack Configuration -

Recommendations for Using QSI-Nano® NiFe Coated Electrodes in Water Electrolysis

Electrolyte: Alkaline, preferably 33 wt% potassium hydroxide (KOH) in distilled water.

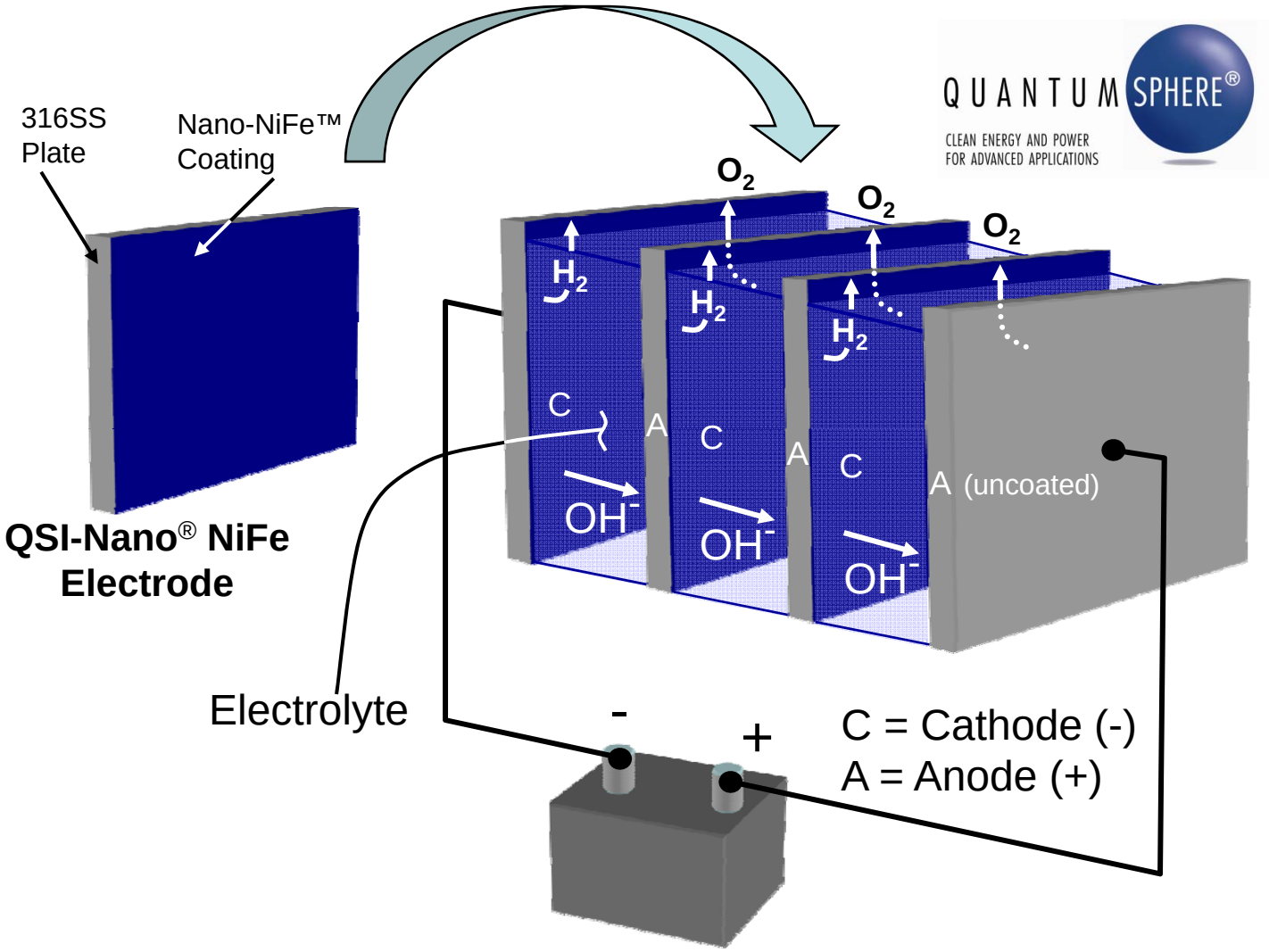
Water makeup supply: Distilled water

Electrode spacing: 0.375" or less. Spacing should be small enough to minimize resistance from electrolyte, yet not too small where the H_2 and O_2 bubbles increase resistance from obstruction of ion current.

Operating temperature: Maximum of 80 ºC. (176 ºF). Electrolyte resistance decreases with increasing temperature, so electrolysis becomes more electrically efficient with increasing temperature.

Voltage/Current: Voltage will typically be a little above 2V per cell and decrease to below 2V as temperature increases from room temperature to 80 ºC (176 ºF). A current density range from a few mA/cm^2 through 500 mA/cm^2 is acceptable. The specific voltage/current behavior strongly depends on cell and stack design.

Note: The nano coated side of the electrode is the cathode (negative, hydrogen producing) electrode, and in a bipolar stack arrangement must be facing the adjacent anode as shown in the figure. This polarity is important for correct operation of the electrodes. In a single cell arrangement, simply ignore the middle electrode in the figure.



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