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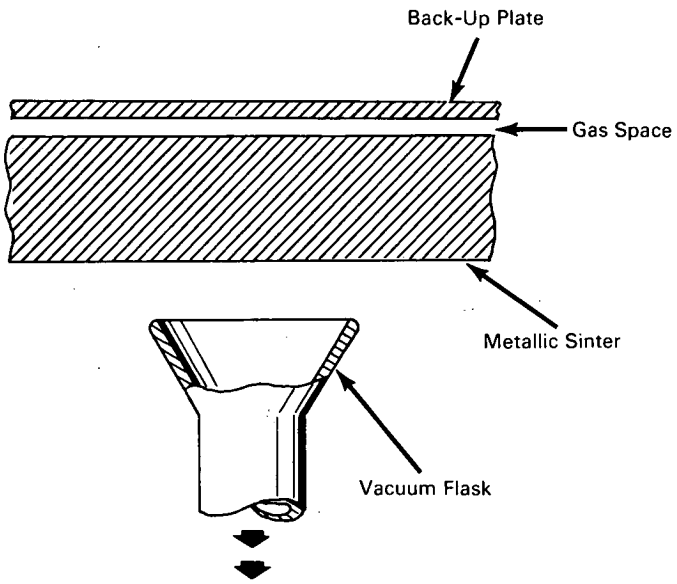
NASA TECH BRIEF

Fuel Cell Life Improved by Metallic Sinter Activation After Electrode Assembly Welding



The problem:

To improve the service life of fuel cell electrodes. Current techniques of welding activated metallic sinter (a porous metal structure) to the metal backup plate of the electrode generally results in undesirable porous welds. In addition, the metallic sinter has frequently had a high corrosion rate that can cause a drastic performance loss and possible failure of the fuel cell.

The solution:

Perform the welding before the metallic sinter is activated, and then activate by depositing finely divided metal within the sinter structure from a solution that also contains corrosion inhibiting ions. Since there are several welding techniques that can produce satisfactory welds between the nickel backup plate and unactivated metallic sinter, the major part of this problem solution is the activation of the metallic sinter by flowing an appropriate activator solution through the porous sinter while attached to the backup plate.

How it's done:

One side of the metallic sinter is attached to a sheet metal backup plate by means of, but not limited to, electron beam welds. The activation procedure consists of cleaning the sinter, passing an activator solution through the sinter, and recleaning the sinter. The initial electrode cleaning is done by soaking 5 minutes in deionized water, and then removing the entrapped water by applying a vacuum (from the open end of a vacuum filter flask) to the exposed side of

(continued overleaf)

the sinter. The activator solution (including the corrosion inhibitor), is allowed to flow into an opening between the sinter and backup plate surfaces (e.g., the gas passage area in fuel cell assemblies). The solution is forced through the sinter either by gravity force or by a vacuum applied to the exposed face of the sinter (as was done in the initial cleaning operation).

The relative amount of sinter activation is noted by the change in sinter color. If the color is near black, a longer activation time is used before applying the vacuum. The electrode is then cleaned by forcing deionized water to flow through the sinter into a vacuum flask. The residue collected in the vacuum flask by the last two vacuuming operations is weighed, and this weight is subtracted from the initial weight of activator particles to give the weight of the activator entrapped by the metallic sinter. The electrode is then dried at 235° F ± 35° for two hours.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Manned Spacecraft Center
Houston, Texas 77058
Reference: B67-10436

Patent status:

No patent action is contemplated by N ASA.

Source: W. A. Taylor
of Pratt and Whitney
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