

Hydrogen absorption and excess heat in a constantan wire with nanostructured surface.

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A constantan wire with a diameter of 200 microns and 25 cm length, previously treated to induce the formation of two nanostructured layers on its surface, was used for excess heat tests in hydrogen atmosphere at different temperatures. From ambient temperature up to a maximum temperature of 350 °C, the reactor and wire main parameters were monitored (heater power, wire resistance and temperature, chamber temperature, hydrogen pressure, ambient temperature). Overcoming 150 °C, was observed a substantial decrease of the wire resistance, as already highlighted in previous experiments with similar material (Fig. 1) [1]. Conversely, using a material without a nanostructuring surface treatment, the change in resistance of the wire was found to be negligible. Several tests with inert material were used to make the thermal reactor calibration; then using the surface treated wire, after the stabilization of the resistance value, it was observed a decrease of the heater power needed to reach temperatures higher than 170 °C in comparison with those for the reactor calibration, with the higher deviation at 350 °C (1.2 W). An EDX analysis of the active wire after a “positive “ test (with excess heat) showed the presence in areas with surface morphological alteration of elements unrelated to the original composition of constantan wire. The elements found are the same also highlighted by other researchers in similar test conditions, but with different materials. Similar findings were also observed with thin films of palladium in deuterium or hydrogen atmosphere at room temperature, but with the hydrogen atmosphere only with irradiation by means of low-power HeNe laser [2].

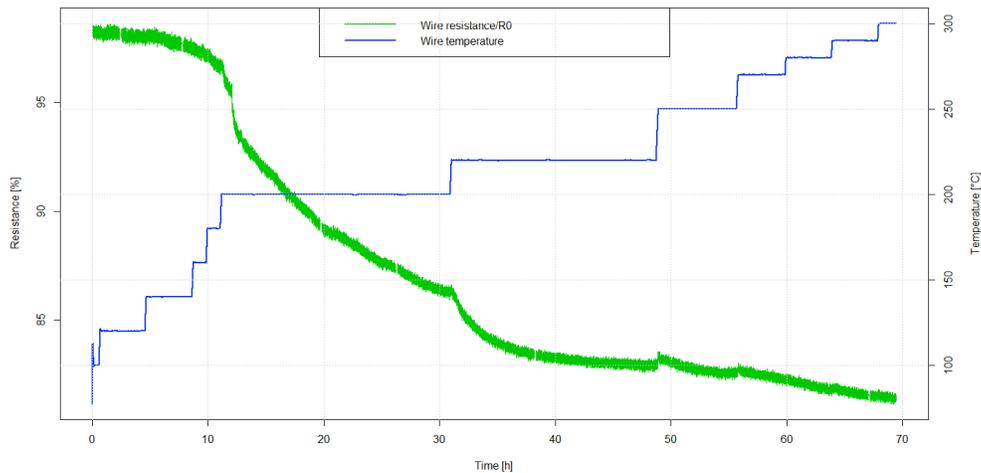


Figure 1. wire R/R0 trend at various temperature

[1] F. Celani et al., “Experimental results on sub-micro structured Cu-Ni alloys..”, at X Inter. Workshop on Anomalies in Hydrogen-Metal Systems, Pontignano, Italy, April 10-14, 2012, in publishing (J. Chem. Mat. Res.; March 2013).

[2] V. Nassisi et al., Modification of Pd-H₂ and Pd-D₂ Thin Films Processed by He-Ne Laser; J. Condensed Matter Nucl. Sci. 5 (2011) 1-6