

SURFACE PASSIVATION EVALUATION

ESCA and AES

The following data represents an analysis of AISI 316L Stainless Steel which was passivated in contemporary ways with both nitric acid (ASTM A-967, Nitric Type 2) and CitriSurf 2050 (A-967, Citric Type 4). The analysis was completed with both Electron Spectroscopy for Chemical Analysis (ESCA)(or XPS) and Auger Electron Spectroscopy (AES) to quantify the surface chemistry of the stainless steel after passivation.

All samples were prepared in such a way as to avoid organic/ionic contamination during handling. The samples were analyzed using standard ESCA and AES techniques.

The ESCA results are tabulated in Figure 1. SEMI standards are 1.5/1 minimum for Cr/ Fe ratio; and 3.2/1 minimum for Cr_xO_x / Fe_xO_x ratio for the device tested.

The AES data is tabulated in Figure 2, below. Once again the figures show a greater oxide thickness and maximum depth of enrichment for the CitriSurf passivated specimens, indicating that the level of enrichment of the Chromium layer on the surface is better.

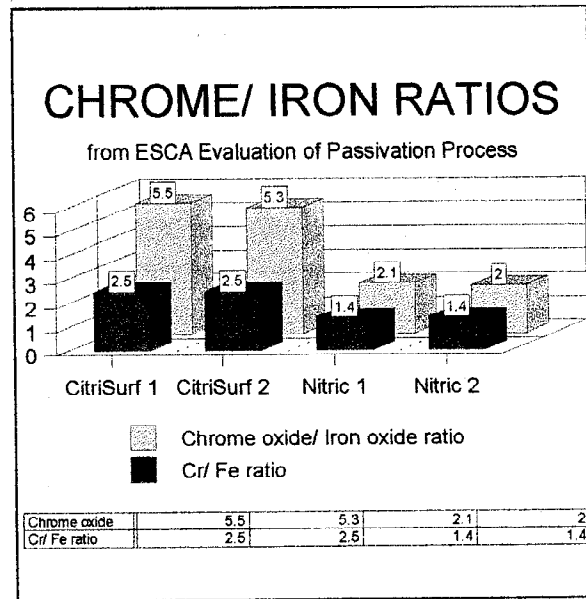


Figure 1.

AES data is more subjective than the ESCA data, but still shows the relative improvement in this test.

AES Depth Profile Results

Sample	Oxide thickness	Max. Depth of Enrichment	Depth of Enrichment
CitriSurf 1	27.0 Å	18.0 Å	17.0 Å
CitriSurf 2	28.0 Å	19.0 Å	17.0 Å
Average	27.5 Å	18.5 Å	17.0 Å
Nitric 1	21.0 Å	13.0 Å	12.0 Å
Nitric 2	17.0 Å	11.0 Å	11.0 Å
Average	19.0 Å	12.0 Å	11.5 Å

Figure 2.