

Anodes for Chrome Plating in Fluoride Containing Baths

Fluorides are added to Cr⁶⁺- and Cr³⁺- baths

- sodium fluoride up to 500 mg F⁻ / l is added to activate steels by polarity reversal,
- fluoroborates or silicofluorides are added in self-regulating Cr⁶⁺-baths. The F⁻-content varies with the bath producers and reaches up to 2 g F⁻/l.

Only the free F⁻ attacks the metals. The severeness of the corrosion depends on the F⁻-content, other bath parameters and the anodic current density and starts from the weakest surface areas, like scratches, fissures and pores in a coating. The user seldom knows the F⁻-content of his bath. Therefore tests are advised for the producers or users of chrome baths.

Unplatinised Ti, Nb or desired other valve metals are submerged into the chrome bath under working conditions, contacted anodically. While increasing the voltage the tested metal shows with the jerky current increase it's breakdown-voltage.

The practical experience shows

Ti withstand F⁻ up to 10 mg / l, a PtTi-anode with 5 microns Pt works nearly one year at 50 mg F⁻ / l, nevertheless we recommend for this use a PtNb-anode. Nb withstands a F⁻-content until 600 mg / l, a PtNb-anode is used from 50 to 500 mg F⁻ / l upto currents of 20 Amps / sqdm. For even higher F⁻-contents PtW can be used. But metal mesh out of tungsten can not be produced.

Also fluoride is added to decorative black Cr³⁺-baths. For these baths mixed oxides activated titanium (**MoxTi**) is applied. In the version of IrTa-oxide users have added F⁻ up to 50-100 g F⁻ / l. The coating withstand up to 600 g F⁻ / l, but scratches and pores in the coating limits the use. The whole anode immersed inclusive the splash zone needs to be covered with the Mox-layer.

PtTi-anodes with 5 microns Pt-layer failed after 11 months in a bath of 90 mg F⁻/l. MoxTi-anodes were used for years in a trivalent chrome bath at 70 mg F⁻/l.

Conclusions:

PtTi-anodes can only be used at low F⁻-content of ~ 10 mg F⁻/l. For F⁻-content up to 600 mg/l Nb is be used, higher F⁻-content requires tungsten as the base. The user is advised to test the suitability of Nb or W as anode substrates under the actual plating conditions.

For further information please contact Metakem.