Technical Bulletin No. 6

Choosing the Best Crystal for Your Coating Process

There are a wide variety of coating technologies available to thin film engineers. In light of this, determining the best crystal for a given process may be difficult. The following is a guideline for the application appropriate crystal:

Fil-Tech Recommends Gold For Low Stress Metalizing

The most common thin film process is the deposition of aluminum, gold, copper, and silver to provide electrical contacts or optical reflectance. These films are relatively free of tensile or compressive stress and are deposited at room temperature. They are soft and easily scratched, but usually do not flake off or damage substrates.

These films can be monitored using gold, Longer Life Gold, silver, or Stress Relieving Alloy electrode crystals. We routinely deposit over 60,000 Angstroms of gold and 500,000 Angstroms of aluminum on 6 MHz crystals before changing to a new crystal. Select the corresponding Fil-Tech crystal for your system:

Fil-Tech Gold	Part No
Inficon	QI8010
Intellemetrics	QI8010F
Sloan	QS3952
Balzers	QB104G

Fil-Tech Recommends Longer Life Gold Or Stress Relieving Alloy For Your High Stress Metalizing

Thin films of nickel, chromium, molybdenum, zirconium, nichrome, titanium, and inconel develop high stresses when deposited. These films often flake or crack at a thickness above 100 Angstroms, and in some instances, can even craze or crack the substrates they are coating. This stress is quickly transmitted to the quartz crystal and manifests as a sudden rate jump or a series of rapidly occurring positive and negative rate spikes. In some processes this can be tolerated, but in others, may negatively impact evaporation source control.

The best choice for these materials is either a Longer Life Gold or Stress Relieving Alloy crystal. The electrode compliance or yielding tends to reduce the film stress and diminish, and often eliminate, the erratic rate changes. Select the corresponding Fil-Tech Longer Life Gold or Stress Relieving Alloy crystals for your system:

Fil-Tech	Longer Life Gold	Stress Relieving Alloy
Inficon	QI8012	QI8008
Intellemetrics	QI8012F	QI8008F
Sloan	QS3952GL	QS3954
Balzers	QB104GL	QB104A

Fil-Tech Recommends Stress Relieving Alloy For Dielectric Material Optical Coating

Dielectric materials, including magnesium fluoride, titanium dioxide, silicon monoxide and dioxide, aluminum oxide, and thorium fluoride, are frequently used for their optical transmission or reflectance properties and are the most difficult to monitor. These films do not adhere well unless the substrate is heated to temperatures of 200 degrees C or more. When deposited on water-cooled crystals, these films exhibit tremendous stress upon condensation and can easily cause crystal failure within the first 1,000 Angstroms of coating.

The best choice for dielectric materials is a Stress Relieving Alloy electrode crystal. Positive and negative rate spikes can be reduced dramatically. Laboratory results have also shown a usable life increase of 100% for magnesium fluroride and silicon dioxide. In most cases crystal life can also be extended approximately 50% by raising the sensor head cooling water termparture to 50 degrees C (from the normal 25 degrees C). Select the corresponding Fil-Tech Stress Relieving Alloy crystal for your system:

Fil-Tech Stress RelievingAlloy	Part No.
Inficon	QI8008
Intellemeterics	QI8008F
Sloan	QS3954
Balzers	QB104A

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