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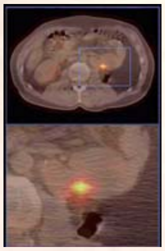
Group

Pyroid® Pyrolytic Graphite Stripper Foil and FoilFork™



Background:

Over the past decade, high energy radionuclide research and production using particle accelerators (cyclotrons) have become widespread. PET imaging is now performed in around the world in over 2,000 sites, using mobile and fixed PET and PET/CT scanners.

Medical imaging will continue to accelerate radionuclide production since the resultant imaging technology is used to diagnose and manage the treatment of cancer, heart disease, brain disorders (Alzheimer’s and Parkinson’s disease), gastrointestinal disorders, lung disorders, bone procedures, kidney and thyroid disorders, and more.

The process is a proven cost effective, noninvasive, safe and painless procedure.

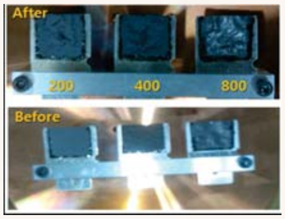
Carbon Stripper Foil Basics

Thin film carbon foils are used to strip electrons thus creating an H+ ion (proton) beam to produce the short lived, critical, radionuclide that is injected into the patient that enables the imaging process.

It is well understood that stripper foil lifetimes depend on the form of carbon used, the method of mounting, and their operating conditions.

The conditions of mounting contribute greatly to the effectiveness of the stripper foil. The typical mount consists of an aluminum frame holder that is mounted into a carousel.

During operation, the beam current creates very high thermal loads (2,000 °C) on the foils through ionization loss, transferred by the radiation emission and through heat conduction on the mounting holder [1].



Since the coefficient of thermal expansion of aluminum (24 ppm) is typically an order of magnitude different than the carbon based stripper foil, this creates extremely high thermal stresses. These stresses contribute to warping, tearing, and ultimate failure of the stripper foil.

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In addition, lifetimes of the carbon foils are shorter for thinner foils with higher beam currents [2].

Ultimately, when foils begin to degrade, they become less efficient and lead to lower radionuclide production productivity. Many users define foil lifetimes based on a falloff in radionuclide output.

It is also reported that non uniformity in composition can result in differential foil expansion under operation. Foils are typically mounted so that the central part is irradiated and experience high localized stress at the border of this irradiated zone [3]
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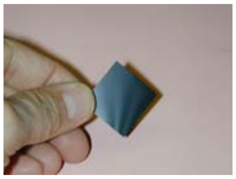
Pyroid® Pyrolytic Graphite Stripper Foil and FoilFork™ eliminate the potential CTE thermal expansion differences that happen since they are both made of the same pure, pyrolytic graphite material.

In addition, arc-evaporated foils and polycrystalline (PCG) graphite foils introduces impurities and lattice defects [1]. And the PCG foils contain approximately 25%, non-graphitic, low temperature organic(s) contamination. Each of these can leads to hot spot foil failure.



Pyroid® Pyrolytic Graphite Stripper Foil

FoilFork™

Using non compatible, inferior carbon foils and fork holders is just asking for trouble. Can you really risk unwanted downtime in your radionuclide production process due to foil failure?

Pyroid® Pyrolytic Graphite Stripper Foil and FoilFork™

- **Highest Purity**
- **Highest Uniformity**
- **Highest Thermal Stability**

The Smart Choice for all High Energy Electron Extraction Applications

For Details or Samples Call, FAX or Email

Toll Free: 484-541-7090 FAX: 610-250-3325

[1] Investigation of Cyclotron Carbon Foil Lifetimes in Relation to its Thickness J.H. Kim#, S.G. Hong, J.W. Kim, Rare Isotope Science Project (RISP), Institute for Basic Science (IBS), Daejeon, Korea Y.G. Choi and Y.S. Kim, Proceedings of Cyclotrons 2013, Vancouver, BC, Canada

[2] J.O. Stoner Jr., S.A. Miller, C. O. Jolivet, Nucl. Instrum. And Meth. A 590 (2008) 57-65.

[3] J.O. Stoner Jr., C. O. Jolivet, Nucl. Instrum. And Meth. A 590 (2008) 51-56.