NANO3D SYSTEMS LLC
1110 NE Circle Blvd., ATAMI/Bldg. 11, Corvallis, Oregon 97330-4254
T 503-927-4766| F 541-758-9320| http://www.nano3dsystems.com

Polonium (Po^{84})

Properties

Polonium is a silvery-gray metal with an atomic mass of 210. It has a density of 9.2 g/cm^3, a melting point of 254 ^oC and a resistivity of 40 µOhm cm. It is highly radioactive element with no stable isotopes. ^{210}Po is considered one of the most radiotoxic naturally-occurring radionuclides [1–3].

Polonium has the valences in compounds of +2 and +4, while it also exists in other oxidation states such as -2, +5 and +6. Its standard electrode potential in respect to Po^{+2} is +0.38V and Po^{+4} is +0.55B. It dissolves readily in dilute acids but it is only slightly soluble in alkalis. Polonium is a very rare element in nature of the order of 1 part per quadrillion because of the short half-life of all its isotopes.

Plating Solutions

One of the characteristics of Po is its ease of deposition, either by chemical displacement of less noble metals or by electrodeposition. Polonium can be electroplated at room temperature from acidic aqueous solutions containing acids such as nitric, hydrochloric, acetic, sulfuric, phosphoric, perchloric and soluble salts of Po-210 [4-6].

Applications

The alpha rays emitted by polonium can be used to eliminate static electricity produced during processes such as rolling paper, wire, and sheet metal. However, beta ray sources are more commonly used as they are less dangerous. Polonium was also part of brushes or more complex tools that eliminate static charges in photographic plates, textile mills, paper rolls, sheet plastics, and on substrates (such as automotive) prior to the application of coatings. Applications of polonium are limited, since it is harmful both through its chemical toxicity and its radioactivity.

References:

1. G.G. Jia et al. *J. Radioanal. Nucl. Chem.* **247**, 491–499, 2001.
2. M.S. Al-Masri, A. Nashawati, and Y. Amin, and B. Al-Akel. *J. Radioanal. Nucl. Chem.* **260**, 27–34, 2004.
3. M.S. Al-Masri et al. *J. Radioanal. Nucl. Chem.* **260**, 405–412, 2004.
4. P.E. Figgins. *The Radiochemistry of Polonium.* Mound Laboratory, Miamisburg, Ohio, Jan. 1961.
5. S. Kihara, Z. Yoshida, and M, Matsui. *Bull. Inst. Chem. Res., Kyoto Univ.* **66**(2), 1988.
6. B.B. Babatunde. *Challenges* **7**(2), 18, 2016.

CONTACT NANO3D SYSTEMS LLC TO FORMULATE POLONIUM PLATING SOLUTION PER YOUR REQUIREMENTS