Foster LoPro® Radiopaque Compounds

Today's catheters are used to diagnose and treat smaller and more distal areas of the vascular pathway, requiring smaller device components than ever before. Many of these devices must be visible under fluoroscopy to ensure proper placement during the procedure; yet, plastics used for the construction of these devices are inherently transparent to x-ray and fillers must be blended into the polymers to provide the required radiopacity. Foster LoPro® Radiopaque Compounds include a wide range of the most advanced radiopaque fillers and polymers to create high quality compounds required for small, 'low profile' device designs.

Applications for LoPro® Compounds

LoPro® compounds are selected for traditional as well as the most advanced devices in a range of therapies:

Interventional Cardiology – Percutaneous Transluminal Coronary Angioplasty (PTCA) devices now reach smaller vascular pathways in and around the heart to deploy balloons that deliver life saving stents. LoPro® compounds provide necessary visibility for physicians navigating these small, thin wall catheter shafts to the therapeutic region. LoPro® tungsten filled polymers replace gold marker bands for substantial visibility and location of the device distal tip.

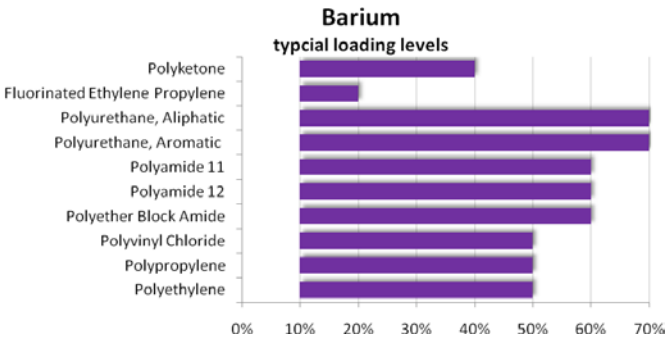
Interventional Radiology – Small diameter, multi-lumen catheters of today allow for a wide range of therapeutic applications in radiology that require radiopaque compounds. LoPro barium formulations, particularly in urethanes that soften at body temperature, are ideal for peripherally inserted lines and drainage catheters. Increased pushability to reach more distal vascular regions for angiographic imaging or therapeutic ablation will benefit from a wide selection of LoPro® formulations based on polyamide-based polymers with bismuth radiopacifiers.

Neurology – Neurological catheters demand excellent mechanical properties to reach the distant therapeutic site from the point of vascular insertion, and sufficient radiopacity for visibility of the small diameter, thin wall catheters. LoPro® tungsten filled compounds provide excellent visibility for diagnostic and therapeutic catheters. LoPro® bismuth filled compounds have been designed for applications such as embolization catheters used to block abnormal blood vessels, most commonly to prevent aneurysms.

Implants – The use of polymers structural devices from spinal cages to dental implants is rapidly expanding. Radiopaque additives allow implanted polymers such as PEEK or polyethylene to remain visible to the physician well after surgery. Foster's dedicated clean room compounding operations are designed to manufacture LoPro® radiopaque formulations for implant devices under cGMP conditions.

Radiopaque Fillers

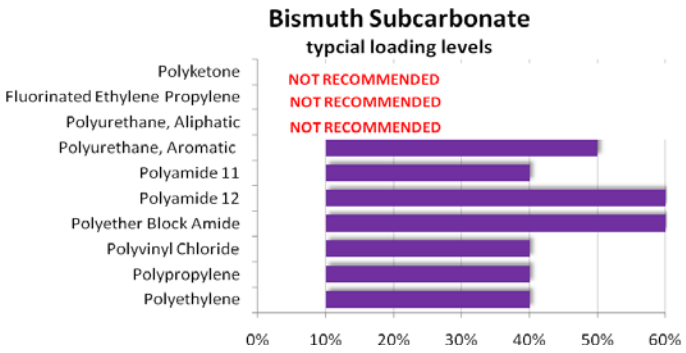
Barium Sulfate ($BaSO_4$) was the first radiopaque filler widely used in medical formulations. It is a relatively inexpensive white powder that has excellent process stability. High loadings are required for comparable radiopacity to other fillers.

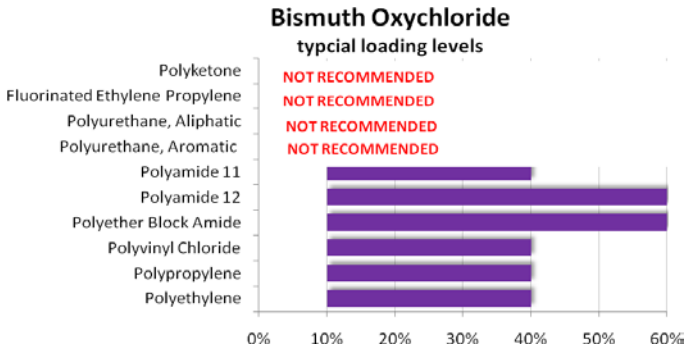


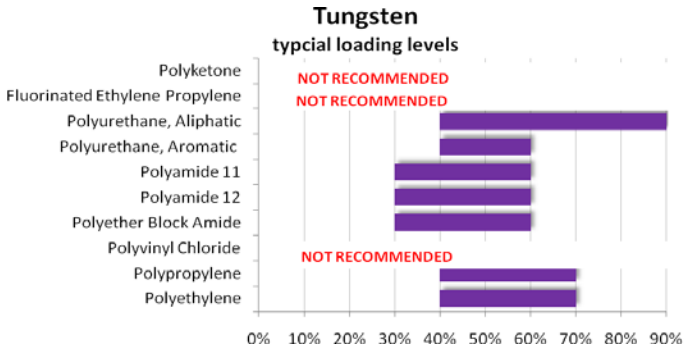
Bismuth Subcarbonate ($Bi_2O_2CO_3$) offers greater radiopacity that barium sulfate and can be added in less quantity to achieve comparable results. It is a white powder with high tinting strength, thus limiting color matching in some instances. It is limited by processing temperatures (yellows at 400 F) and in some polymers (not compatible with thermoplastic polyurethanes).

Bismuth Oxychloride (BiOCl) provides excellent radiopacity and is compatible with a wide range of polymers. It is more temperature stable than bismuth subcarbonate. White 'platelet-like' particles provide a smooth, pearlescent finish on components. This can provide limitations to exact color matches.

Tungsten (W) is a very heavy metal powder that is compatible with virtually all polymers at very high loadings by weight. It is dark gray in color and produces a matte finish in high concentrations, providing substantial restrictions for color matching. Polymer compounds with tungsten can be very abrasive on processing equipment. However, it is a filler of choice in very thin walled devices where radiopacity is critical.







Radiopacificer Type	Specific Gravity	Particle Size (µm)	% Metal	Density	Atomic #	K-Edge	Effective K-Edge
Barium Sulfate	**4.4**	**0.5-2**	**58.8**	**4.5**	**56**	**37.4**	**99**
Bismuth Subcarbonate	**8.0**	**1-2**	**79.61**	**7.7**	**83**	**90.5**	**555**
Bismuth Oxychloride	**7.8**	**2-12**	**81.1**	**8.0**	**83**	**90.5**	**587**
Tungsten	**19.3**	**1-2**	**100**	**19.35**	**74**	**69.5**	**1350**

Foster Corporation
45 Ridge Road
Putnam, CT 06260
(860) 928-4102
www.fostercomp.com