

Platinum alloys are used extensively in medical devices such as stents
(credit: Johnson Matthey)



WE ARE FAMILY

The family of Platinum Group Metals is used to make alloys that provide optimal solutions for a range of applications

Derived from the same ore, the Platinum Group Metals (PGMs) – platinum, palladium, rhodium, ruthenium, iridium and osmium – are a family of six individual elements that are chemically, physically and anatomically similar. They have complementary properties that can be leveraged and combined to meet specific requirements through the formulation of alloys.

An alloy is a material that is made up of at least two different chemical elements, one or more of which is a metal. Combining and applying these elements to provide the best solution for a given circumstance requires specialist knowledge of metallurgy and an in-depth understanding of chemical reactions and manufacturing processes.

The most important metallic component of an alloy, often comprising 90 per cent or more of the material, is called the primary or main metal. The other components of an alloy are present in much smaller quantities, sometimes less than one percent of the total.

Strength in numbers

PGM alloys are made for a variety of reasons. Usually, the purpose is to enhance certain characteristics such as electrical conductivity, corrosion resistance, mechanical strength or temperature resistance, making the alloy more useful than the original individual elements. In some cases, a combination of PGMs may reduce the overall cost of the material while preserving important properties.

Platinum-rhodium alloys have widespread industrial uses; the addition of rhodium provides increased hardness and corrosion resistance as well as higher catalytic activity.

These alloys are used in applications where the ability to withstand high temperatures is required, such as in the heating element of electric furnaces or as components and tools for glass and fibre glass production. A five to ten percent rhodium alloy gauze is used as a catalyst in the production of nitric acid which is a key ingredient of fertiliser.

DID YOU KNOW?

Platinum alloy wire is used in the manufacture of aircraft engine turbine blades.

Platinum alloys – especially those incorporating ten to thirty percent iridium – are known for their excellent biocompatibility, radiopacity (visibility in x-rays) and electro-conductivity and are used extensively in permanent, implantable medical devices such as pacemakers.

In jewellery fabrication, platinum is typically 90-95 per cent pure in many markets. It is alloyed with other PGMs like rhodium or iridium depending on the end use. For example, platinum-iridium alloys that are especially hard and polish well are

suited to machined products like watch backs. Many wedding bands are made using a platinum-ruthenium alloy.

Platinum-based alloys continue to be developed, and a new type of platinum-gold alloy is being developed in the US that has the potential to be 100 times more wear-resistant than high-strength steel. If successful, this new alloy may be used to make electronic (micro electromechanical) components.

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