

PLATINUM ON FILM

Demand for platinum thin film coatings is growing as semiconductor and sensor applications proliferate

The generative artificial intelligence (AI) market is soaring, growing to around US\$1.3 trillion over the next decade from a market size of US\$40 billion in 2022*. The expansion of AI applications is also leading to strong global demand for semiconductors, tiny electronic devices designed to enable functions such as processing, storing, sensing, and moving data. According to some forecasts**, revenues from semiconductors used in AI could increase from around US\$44 billion in 2022 to US\$120 billion in 2027.

Metals Focus, a leading precious metals consultancy, believes that platinum demand will benefit from AI – and semiconductor – proliferation through the use of platinum alloys in sputtering targets.

Sputtering is an established technology which enables a thin film to be applied to an underlying layer (substrate) by eroding or ejecting particles from a source material known as a sputtering target. The process is repeatable and can be scaled up from small research and development projects to production batches involving medium-to-large substrate areas of different shapes and sizes. Sputtering allows films that are only a few atomic or molecular layers thick to be deposited onto a surface.

By using thin film technology, materials can be produced with specific, customised properties that are often difficult or impossible to achieve with other technologies; thin films have assisted with the development of microelectromechanical systems (MEMS) and nanotechnologies within the field of electronics. In addition, thin film technology can often help to save material and costs, as only very small quantities of expensive or rare materials are required. The semiconductor industry uses platinum sputter targets as platinum's conductivity and stability make it an ideal material for creating the thin films necessary to ensure efficient electron flow within a semiconductor.



MEMS sensors. Picture credit: Bosch

Platinum sputtering targets are also used to produce platinum thin film for sensors in a wide variety of uses, including AI, where models need to be trained with large amounts of data. By combining AI models with sensors, such as thermal cameras, ultrasonic sensors, photocells, inductive sensors, radar sensors, and motion sensors, the amount of data needed to train a model can be reduced.

Growing market

In battery electric vehicles, temperature management is one of the keys to maximising battery life and making electric vehicles more reliable, efficient, and durable. Here, platinum thin film sensors can improve battery life by providing precise temperature measurements that allow an electric motor to operate close to its performance limits, achieving high charging and discharging currents.

Due to their flexibility and durability, platinum sputtering targets are used to produce thin films in the manufacture of sensors for the fast-growing and rapidly evolving market for wearables, such as smartwatches and fitness and health trackers, that provide continuous, non-invasive monitoring of vital signs like glucose levels and blood pressure.

Last year, Bosch, a pioneer and market leader in sensors, announced plans to invest three billion euros in its semiconductor business and in sensor development and manufacturing by 2026.

**2023 Generative AI Growth Report, Bloomberg Intelligence*

*** Forecast: AI Semiconductors, Worldwide, 2021-2027, 2Q23 Update, Gartner*

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