Research & Development

Research and development is an integral part of Johnson Matthey's high technology businesses. One of the group's strategies is to differentiate ourselves by using our world class technology and we invest significantly in research and development to develop new products and manufacturing processes. In 2008/09 Johnson Matthey spent £87.6 million gross on R&D.

Our group technology centre located at Sonning Common in the UK is focused on longer term research and has a worldwide reputation for excellence in catalysis and precious metals technology. In addition we have important research centres at Royston, Billingham and Stockton-on-Tees in the UK located close to some of our major businesses. Worldwide we have technical centres in many countries including the US, Japan, Sweden and the Netherlands.

Johnson Matthey Technology Centre

The Johnson Matthey Technology Centre (JMTC) is the group's central resource for longer term research and employs over 180 world class scientists. It supports the research and development of new products and technology across all of Johnson Matthey's businesses and has expertise in catalysis, precious metals, materials science and many other fields in which Johnson Matthey operates.

JMTC has state of the art facilities and resources for the development and testing of catalysts as well as one of the most advanced industrial analytical science groups in the world, equipped with the latest tools for materials characterisation.

Collaboration is important and JMTC works closely with the group's global network of business specific technology centres and development groups. It also participates in external collaborative R&D programmes worldwide.

Many projects at JMTC are sponsored by the operating divisions to meet their longer term objectives. In parallel, our core science projects address the fundamental science that lies at the heart of many of our businesses. Knowledge gained in the core science programmes is used to accelerate and improve product development across the group, reducing time to market and improving our ability to design products to meet customers' needs.

An increasing number of projects address sustainability issues such as energy efficiency, waste reduction, resource utilisation and low carbon technology to support our Sustainability 2017 aspirations. These projects are focused on improving the sustainability performance of our own operations and on developing the next generation of sustainable products and technologies for our customers.

Four examples of projects supporting our Sustainability 2017 programme goals are outlined below.

Next Generation Emission Control Catalysts

Since the acquisition of Argillon we have been working on exploring and optimising synergies between our coated and extruded catalyst technologies. Through combining our expertise in extruded catalysts and catalyst coating we are now developing new emission control catalysts which incorporate the dual functionality of a particulate filter and an ammonia slip catalyst into one single unit. Examples of this more resource efficient and cost effective technology are already in use in the market.

Reducing Spoilage of Fresh Produce

In the UK alone it is estimated that fruit and vegetables account for over 30% by weight of total avoidable household food waste. Better control of spoilage of fresh fruit and vegetables will potentially make a major contribution to reducing waste in this sector. A known cause of premature ripening, disease and softening in fresh produce is the presence of low levels of ethylene gas. Ethylene is produced naturally by fruit and vegetables and controlling the concentration of this gas in the atmosphere in which fresh produce is stored can help to reduce spoilage. In a collaborative programme between Anglo Platinum and Johnson Matthey, a novel supported palladium material with a significant ethylene adsorption capacity at room temperature has been developed. The scientific design of this new ethylene removal product is based on our detailed knowledge of ethylene activation over palladium and adsorption of the activated species on advanced support materials. Following successful laboratory testing, the new product is being marketed within one of our business units and is undergoing trials in the fresh produce supply chain.

Cleaner use of Coal

The use of coal will increase globally for chemical manufacture, fuels and power generation. However coal is an inherently dirty fuel, containing mercury and many other harmful components. Johnson Matthey, in collaboration with the US Department of Energy's National Energy Technology Laboratory (NETL), has developed novel palladium based sorbent technology for removing mercury from high temperature syngas derived from coal gasification processes. Compared to existing low temperature mercury capture by activated carbon, high temperature capture retains the high thermal efficiency of advanced combustion turbine power generation processes such as IGCC (integrated gasification combined cycle). This is a key element of the strategy to increase the use of abundant coal resources in countries such as the USA and is a likely route to CO_2 capture and storage. In 2008, NETL and Johnson Matthey received a prestigious R&D Top 100 Award for this novel mercury removal technology.

Fuel Cell Catalysts

Platinum is the catalytically active metal of choice in many fuel cell applications. However, given its high cost, a key goal is to optimise the number of platinum atoms available as catalytically active sites, particularly when designing catalysts for large scale commercial fuel cell applications. In a new approach to catalyst design, we are able to place platinum atoms on the surface of nanoparticles of a less expensive metal, creating a 'core shell catalyst'. In these core shell platinum nanocatalysts all the platinum atoms are available for catalytic reactions at the surface. Furthermore, through careful choice of the less expensive metal it is actually possible to enhance further the activity of the platinum atoms to give higher efficiency than using platinum alone. This new core shell technology has the potential to enable the more resource efficient manufacture of higher performance fuel cell catalysts.