PRESS RELEASE

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World Gold Council and Queen's University, Belfast Developing Innovative Gold Based Catalyst to Reduce Power Station Pollution

World Gold Council-supported research targets advancement towards gold based catalyst to significantly reduce mercury emissions from coal-fired power stations

World Gold Council and Queen's University, Belfast, today announced a new research collaboration to develop a gold-based catalyst that will remove mercury contamination from flue gas streams in coal fired power stations. The research team, led by Professor Hardacre at Queen's University, Belfast, aims to develop new catalysts which have the potential to provide higher activity and stability and are more effective and long lasting. The project seeks to improve existing technology which is currently undergoing testing in a US power plant under the auspices of the U.S. Department of Energy.

Mercury is a neurotoxic metal which causes damage to the environment and the health of humans, and is especially damaging to developing foetuses, making it a high priority in environmental legislation. Global interest in mercury emissions reduction has increased recently with the introduction of US legislation to reduce emitted levels of mercury to around 90% of their current values by 2011 – 2015. It is estimated that 4,400 to 7,500 metric tons of mercury are emitted in the atmosphere globally every year, approximately two thirds of which are through human activity[1].

Most forms of mercury can be easily removed from flue gas streams via physical processing, however some forms need to be oxidised before removal and this is the role that catalysts play. Previous research has examined the ability of a number of metal based catalysts to fulfil this task, of which gold based systems have proven to be one of the most promising in initial screening. Gold has a high conversion level which is maintained over longer periods of time than alternative materials, of which most show a decrease in activity, and therefore effectiveness, over time. This research aims to investigate the reasons for this and develop a system that will circumvent the problems associated with existing technology, making catalysts more effective and long-lasting. It will also investigate a method by which the catalyst may be reactivated after use.

Once developed it will have the potential to significantly improve reduction levels of mercury emissions from coal-fired power stations and may also be applied to other sources of mercury pollution such as crematoria and other plants.

The research is being funded over the next three years by World Gold Council's Gold Research Opportunities Worldwide (GROW) Programme which co-funds potential new scientific and industrial uses of gold. This research could feed new formulations into commercial applications of catalysts in the next few years, following the completion of the US trial.

Dr Richard Holliday, Head of Industrial Applications, at World Gold Council, said:

"The public and governments around the world are increasingly recognising the importance of protecting the environment, and mercury reduction is a major priority. World Gold Council is pleased to be supporting this research which may result in significant reductions in levels of a pollutant that has devastating consequences for people and nature. The usefulness of gold in industry and technology has been recognised for a long time, and this research highlights its ability to bring environmental benefits."

Professor Hardacre, Director of CenTACat Queen's University, Belfast said:

1 Statistics from the Environmental Protection Agency

"This application represents a likely new use for precious metal catalysts, however, understanding of the scientific basis by which gold catalysts operate successfully in mercury oxidation has not been widely studied nor published. The support of the GROW programme is therefore vital in the development of this technology. The funding enables us to undertake this research and optimise gold-catalyst performance in this application. The extensive experience of the World Gold Council team in promoting the uses of gold as an industrial catalyst is invaluable to the project. "

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Notes to Editors:

World Gold Council

The World Gold Council (WGC), a commercially-driven marketing organisation, is funded by the world's leading gold mining companies. A global advocate for gold, the WGC aims to promote the demand for gold in all its forms through marketing activities in major international markets. For further information visit www.gold.org.

World Gold Council GROW Program

The WGC's Gold Research Opportunities Worldwide (GROW) Program co-funds potential new scientific and industrial uses of gold. For example, the programme has recently supported the development of an inkjet printable gold ink in conjunction with Johnson Matthey. The GROW programme is supported by a long-established and extensive network of experts, the Editorial Board of World Gold Council's peer reviewed journal Gold Bulletin and the Technical Committees of World Gold Council scientific conferences, who provide technical advice to the programme.

Each year World Gold Council provides financial support, via its GROW (Gold Research Opportunities Worldwide) programme, to a limited number of research and feasibility studies aimed at uncovering potential new industrial uses for gold. For more information please visit:
http://www.utilisegold.com/wgc_initiatives/research_funding/

How the Technology Works

The mercury present in the exhaust streams is in three forms namely elemental, cationic and particulate bound. Whilst it is relatively straightforward to remove the latter two forms via physical processing, elemental mercury must be oxidised prior to removal. Metal based heterogeneous catalysts can promote the oxidation of mercury in the presence gas such as chlorine and oxygen. In the absence of the promoter gases a significant loss in activity is found. The mechanism of both the oxidation process as well as how the deactivation of the catalyst occurs. This research project will provide insight into the operation of the catalyst and how it changes during reaction using advanced transient and spectroscopic *in-situ* tools. Through the understanding derived a range of new catalysts will be formulated which will prevent the long term deactivation whilst maintaining high activity.

1 Statistics from the Environmental Protection Agency