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## Editorial

# Johnson Matthey and Advanced Functional Materials

Readers of this journal and its predecessor title, *Platinum Metals Review*, will be well aware of Johnson Matthey's long-standing expertise in platinum group metals (pgms) science and technology. The company has been active in this area for most of its long history, starting in 1817. Fast forward to the 21st century and many of Johnson Matthey's products and research and development (R&D) activities revolve around the development and applications of a range of advanced materials, not just pgm. These materials take many forms, from powdered or coated catalysts and coated components to fully functional devices.

The design of functional materials requires deep understanding of the science. As well as its knowledge of pgm chemistry, Johnson Matthey has over the years gained much experience in surface science and it is these together with other specialised expertise that allows new products to be designed, optimised, characterised and scaled up to solve real-life problems. Some 89% of Johnson Matthey's sales are currently from products with sustainability benefits (1).

This issue of the *Johnson Matthey Technology Review* deals with the theme of Advanced Functional Materials with a particular focus on zeolites and nanoparticles. These two classes of materials can be applied in a range of areas from process catalysis and emissions control to environmental clean-up.

Insights into nanoparticle synthesis and assembly are provided in a conference review (2), while another conference review discusses the role of materials chemistry in establishing connections between structure, properties, processability and performance of molecular materials, with emphasis on the contribution of pgms in areas such as artificial photosynthesis and the possible generation of a fuel *via* the photochemical dissociation of water (3). These particles, which are usually titania or zinc oxide coated with a noble metal, are also the subject of an extensive review on their preparation by spray pyrolysis processes (4).

As was promised in a previous Editorial (5) we also present Professor Edward Rosenberg's critical review of the use of ion exchange and sorption methods for the remediation of uranium in industrial and surface waters (6), an essential read for anyone involved in this area.

Zeolites exist in a variety of forms (7) and they may be used in a wide variety of applications including biomass conversion, catalysis for industrial and fine chemicals, photocatalysis and electrocatalysis. Two of Johnson Matthey's scientists review a recent event from the point of view of vehicle emissions control where zeolite based catalysis sees significant applications (8). The vital significance of characterisation techniques in the development of new functional materials is also highlighted in another conference review (9).

### In the Archive

Zeolites have long been used in catalysis and emissions control. Previous papers in this journal have included conference reviews (10, 11) and articles (12). Zeolites loaded with pgms have also made an appearance (13, 14). Just some of Johnson Matthey's innovations involving zeolites have included programmes aimed at creating new applications *via* collaborations with academic groups (15) , a product for preserving the freshness of fruits, vegetables and flowers which is now in commercial production under the brand name (and company) It's Fresh! (16) and also work has been carried out into alternatives to zeolites, for example involving a novel preparation of pgm on carbon (17).

Flame technology is a scalable, continuous and well-established method for production of nanoparticles in large quantities, and Johnson Matthey's development-scale Flame Spray Pyrolysis Facility, housed at the company's main UK technology centre, offers a unique facility for the production of a wide array of nanopowders from single metal oxides such as alumina to more complex mixed oxides, metals and

catalysts. The technique was first developed by the research group of Sotiris E. Pratsinis at ETH Zurich, Switzerland (18). Applications of materials prepared by this technique include catalysis, sensors, biomaterials and microelectronics (19). The photocatalytic activities of titanium dioxide ($TiO_2$) nanoparticles have also been investigated (20).

It is to be hoped that the continuing efforts of many research groups around the world will advance the knowledge and understanding of functional materials such as those discussed here, and develop their application towards a sustainable future.

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# The First Year of the Johnson Matthey Technology Review

Thanks to the high quality of submissions to the journal it has been a successful first full year of publication for the renamed journal, *Johnson Matthey Technology Review*. The top two cited articles of 2015 so far are reviews on the subjects of platinum investment casting (21) and lithium-ion battery anodes (22).

The last full Impact Factor for the predecessor title, *Platinum Metals Review*, was announced in mid-2015 and was a respectable 1.924 (2014). The year 2016 will see the announcement of that title's last partial Impact Factor plus the first partial Impact Factor of the *Johnson Matthey Technology Review.* The first full Impact Factor for the new journal, covering data for its first two full years of publication to 2016, will be expected in mid-2017. These numbers will be reported *via* our website in due course.

Coverage in various library, database and indexing services is progressing. The journal was accepted into Thomson Reuters' Science Citation Index, the basis for the annual Impact Factor, in mid-2014. The assessment by Elsevier's Scopus database is complete and the journal is due to be listed by February 2016.

As always we welcome enquiries or submissions of articles, features and reviews in any of the topics listed in our Editorial Policy. If in doubt contact the Editorial Team for further information.

 