MATERIALS FOR THE FUTURE

ENGINE ADDITIVES HELP SAVE ON GAS

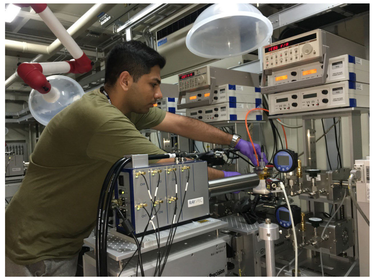
A research team from the University of Texas at Arlington developed a new additive for automotive engine oil that reduces harmful emissions, increases fuel efficiency and improves durability. Conventional additives form a thin film on the surface of moving parts to reduce friction. The team studied how these coatings are formed on engine surfaces, then created an innovative alternative using our VLS-PGM and SXRMB beamlines.

DOI: 10.1016/j.wear.2021.203717
DOI: 10.1021/acs.langmuir.0c02900

BUILDING BETTER CATALYSTS TO CONVERT CARBON DIOXIDE

One way to address climate change is to capture CO2 emissions and convert them to other useful chemicals, such as methanol. In order to turn CO2 into methanol, you need a catalyst to jump-start the electrochemical reaction. Traditionally, these catalysts have either been made out of precious metals like gold or palladium, or base metals such as copper or tin. However, these materials are expensive and break down easily, hindering large-scale implementation. Researchers from the University of Waterloo developed a metal-free catalyst that is cheaper and more durable than metal ones, and is easy to fabricate. The team credited our SM beamline as being in instrumental to their discovery.

DOI: 10.1021/acscatal.2c05935



Ali Feizabadi, Western University

COMBINING METALS FOR BETTER FUEL CELLS

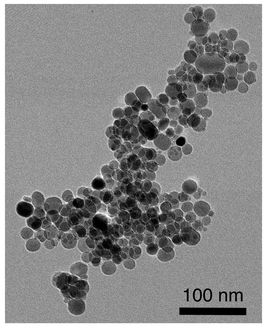
Fuel cells are seen as a promising source of green energy, with the potential to revolutionize various industries including transportation and power generation. While most research in this area has focused on cells that use platinum as the catalyst, there's a scarcity of the material, it's costly, and it's not particularly stable. Researchers from Western University discovered that incorporating other metals reduces the amount of platinum that is required to produce energy, and results in a more stable catalyst for fuel cells. Their breakthrough has the potential to make fuel cells more economically viable and environmentally friendly, driving the broader adoption of clean technologies.

DOI: 10.1021/acs.jpcc.1c04274

NANOSCALE RUST: THE FUTURE OF MAGNETS?

University of Manitoba researchers studied how rust could make the magnets used in everything from blenders to car engines cheaper and easier to produce. The team are particularly interested in a unique type of iron oxide nanoparticle, called epsilon iron oxide. What sets it apart from other magnets is that it's made from two of the most common elements found on earth: iron and oxygen. The magnets we currently use are made of some of the rarest elements on earth. To study the material's structure in different sizes, they collected data at the Advanced Photon Source (APS) in Illinois, thanks to the facility's partnership with the CLS.

DOI: 10.1021/acs.nanolett.1c01512



MEETING THE NEED FOR MAGNETIC MATERIALS

Magnetic materials are super important because they are the backbone of many modern technologies. Using the CLS, researchers from the University of British Columbia discovered a new, adjustable magnetic material made of common elements. The material may one day make our everyday electronics, such as cell phones, cheaper and more environmentally friendly, as current magnetic materials are rare and difficult to mine. Our REIXS beamline was a critical tool in quantifying the material's behaviour, which helps the researchers know its potential applications.

DOI: 10.1021/jacs.2c06768

PEROVSKITES & SOLAR ENERGY

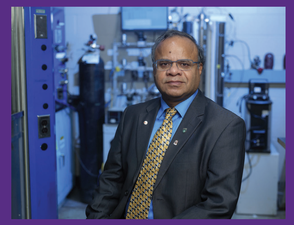
Silicon has long been the standard material used for solar cells, but perovskites, materials based on the same crystal structure as calcium titanium oxide, are becoming the preferred alternative for fabrication. A University of Toronto team has used the CLS to research the capabilities of perovskites in solar cells. Our ultra-bright light showed the never-before-seen transformation of a 3D crystal into a high efficiency solar cell material. Their insights could lead to solar cells that are cheaper and more efficient.

DOI: 10.1038/s41467-021-23419-9

HEATING OUR HOMES WITH LEFTOVER CANOLA

A University of Saskatchewan researcher's exploration of canola meal pellets as an eco-friendly alternative to coal and natural gas for both heat and energy is poised to move into its next phases: sclaed-up pellet production and commercialization. His quest is to find ways to turn leftover materials from crop production, like canola meal, into biocoal.

DOI: 10.1016/j.fbp.2021.09.134.



Ajay Dalai, USask

Left to right: UCalgary researchers Golam Kibria, Adnan Khan, Heng Zhao, Jinguang Hu

TURNING STRAW INTO GOLD

Like the Rumpelstiltskin fable, scientists are using sunlight to turn straw into something more valuable. With the aid of the HXMA beamline, University of Calgary researchers used solar power to convert biomass like wheat straw into hydrogen fuel and value-add biochemicals. This method is efficient, eco-friendly, and lucrative. It uses a straw pre-treatment that yields a high amount of green hydrogen fuel and lactic acid typically used in the food, chemical, and medical industries. The study also opens up opportunities for turning other plant materials into value-add products.

DOI: 10.1002/adsm.202000504.