

## *The Petroleum Industry, Mining, & Synchrotron Science*

The development of natural resources is an integral part of the Canadian economy. However, companies must be responsible when mining, drilling, and refining our resources. The Canadian Light Source, and other synchrotron facilities, is one tool used by companies to solve unknown problems as well as to verify that their industrial projects are maintaining appropriate environmental standards.

Synchrotron science allows researchers to understand the **chemistry of heavy metal elements within mine tailing** thereby better managing risks to the environment. Using techniques such as X-ray absorption spectroscopy scientists can determine if those metals are stable or bio-available. Scientists from the Canadian Light Source conducted research on the mine tailings from AREVA's McClean Lake uranium mine in northern Saskatchewan.



Information gathered by the scientists about the arsenic in mine assisted the McClean Lake mine to maintain ISO 14001 Environmental Accreditation status.

[www.lightsource.ca/brochures/pdf/CLSI\\_Arsenic\\_ISO14001.pdf](http://www.lightsource.ca/brochures/pdf/CLSI_Arsenic_ISO14001.pdf)  
[gsa.confex.com/gsa/2001AM/finalprogram/abstract\\_28827.htm](http://gsa.confex.com/gsa/2001AM/finalprogram/abstract_28827.htm)



**Injecting CO<sub>2</sub> into oil wells extends the life of oil fields**, enhances the economy, and benefits the environment. Scientists are developing ways to improve existing oil recovery technology by better understanding the interaction between CO<sub>2</sub> and different types of soil and minerals underground. To do so, researchers are conducting experiments 'in situ'. This term literally means 'in place'. A microreactor system has been developed that simulates the temperature and pressure that these reactions take place under in oil wells. Though experiments are done at a synchrotron, they are under the same conditions reactions would normally take place under. In situ process observations are central to developing the mechanistic understanding needed to effectively evaluate and engineer improved technologies.

[www.ir.gov.sk.ca/adx/asp/adxGetMedia.asp?DocID=4829,3442,3440,3385,2936,Documents&MediaID=12063&Filename=durocher.pdf](http://www.ir.gov.sk.ca/adx/asp/adxGetMedia.asp?DocID=4829,3442,3440,3385,2936,Documents&MediaID=12063&Filename=durocher.pdf)  
[www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=PubMed&list\\_uids=14968885&dopt=Abstract](http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=PubMed&list_uids=14968885&dopt=Abstract)

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**Blood Diamonds** have been a popular media topic recently. Synchrotron science offers another tool enabling researchers to determine exactly where on earth a given diamond was mined. Scientists used the Canadian on a microdiamond which destructive look at the chemical florescence identifies trace This technique helps scientists different regions have unique this technology companies and certain diamonds originated:



Light Source to shine X-ray light allowed them to take a non-composition of the stone. X-ray minerals within the diamond. determine if diamonds from chemical compositions. With authorities can determine where Canada, Russia or Sierra Leone?

<http://www.eos.ubc.ca/research/diamonds/kopylova/AmMin2005.pdf>

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