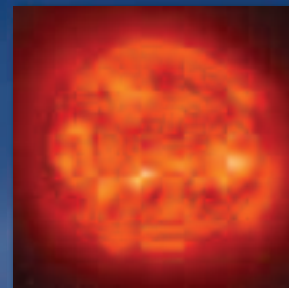
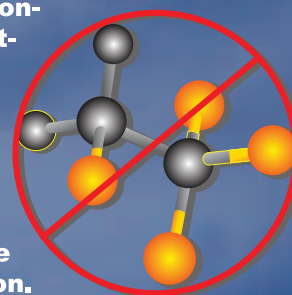


CLIMATE AND THE ADVANCED PHOTON SOURCE

Increased reliance on solar energy would reduce consumption of fossil fuels and limit emissions of climate-changing gases. Use of silicon-based solar cells will accelerate if manufacturers can reduce costs while working around the shortage of high-quality silicon. Research at the Advanced Photon Source (APS) at Argonne, and at the Advanced Light Source at Lawrence Berkeley National Laboratory (both of which are U.S. Department of Energy laboratories), has shown that an inexpensive form of silicon has potential as a component of commercially viable solar cells. Contact: buonassisi@mit.edu



Amid growing awareness of climate change as a concern in need of rapid solutions, researchers from the U.S. Department of Energy's Argonne and Ames national laboratories, and the University of Iowa, are using the APS to learn more about the functioning of magnetocaloric materials. These have potential for wide application in, among other things, environmentally friendly magnetic refrigeration systems that are not dependent on hydrofluorocarbons (such as tetrafluoroethane, shown in 3-D structure at right) and could reduce the adverse environmental impact of conventional, gas-based refrigeration. Contact: haskel@aps.anl.gov



A catalyst that could help eliminate harmful nitrogen-oxide emissions from diesel exhausts has been developed by Argonne researchers with the help of the APS. Several companies have expressed interest in licensing and scaling up the technology to bring it to market. The catalyst is one of several that also show promise for reducing nitrogen-oxide emissions from industrial sources such as coal-fired power plants, and refinery and chemical-plant furnaces. Contact: marshall@cmt.anl.gov



See other side for more information

The Advanced Photon Source at the U.S. Department of Energy's Argonne National Laboratory provides this hemisphere's brightest x-ray beams for research. Scientists and engineers using the APS help assure a bright future for our nation by carrying out research that promises to have far-reaching impact on our technological and economic competitiveness, our health, and our fundamental knowledge of the materials that make up our world.

Argonne is a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC
The Advanced Photon Source at Argonne National Laboratory is funded by the U. S. Department of Energy,
Office of Science, Office of Basic Energy Sciences





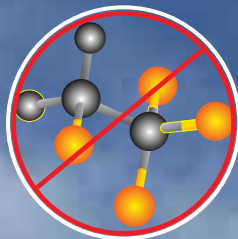
For this study, researchers from the University of California, Berkeley; Lawrence Berkeley National Laboratory; GE Energy; the Fraunhofer Institute for Solar Energy Systems; and Argonne used X-ray Operations and Research (XOR) beamline 2-ID-D and XOR/Pacific Northwest Consortium beamline 20-ID-B at the APS, and the 10.3.1 and 10.3.2 beamlines at the Advanced Light Source, Lawrence Berkeley National Laboratory.

See: Tonio Buonassisi¹, Andrei A. Istratov¹, Matthias Heuer^{2,3}, Matthew A. Marcus³, Ralf Jonczyk⁴, Joerg Isenberg⁵, Barry Lai⁶, Zhonghou Cai⁶, Steven Heald⁷, Wilhelm Warta⁵, Roland Schindler⁵, Gerhard Willeke⁵, and Eicke R. Weber³, "Synchrotron-based Investigations of the Nature and Impact of Iron Contamination in Multicrystalline Silicon Solar Cells," *J. Appl. Phys.* 97, 074901 (2005); and Tonio Buonassisi, Andrei A. Istratov, Matthew A. Marcus, Barry Lai, Zhonghou Cai, Steven M. Heald, and Eicke R. Weber, "Engineering Metal-impurity Nanodefects for Low-cost Solar Cells," *Nat. Mater.* 4, 676 (2005). Author affiliations: ¹University of California, Berkeley; ²University of Leipzig; ³Lawrence Berkeley National Laboratory; ⁴GE Energy; ⁵Fraunhofer Institute for Solar Energy Systems; ⁶Argonne National Laboratory, ⁷Pacific Northwest National Laboratory

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See also: "Making Solar Cells the Quick and Dirty Way," *APS Science 2005*, the annual report of the Advanced Photon Source at Argonne National Laboratory, ANL-05/29, May 2006, p. 40.



This study was carried out by researchers from the Argonne and Ames national laboratories, using the XOR beamline 4-ID-D at the APS.

See: D. Haskel¹, Y. B. Lee², B. N. Harmon², Z. Islam¹, J. C. Lang¹, G. Srajer¹, Ya. Mudryk², K. A. Gschneidner, Jr.², and V. K. Pecharsky², "Role of Ge in Bridging Ferromagnetism in the Giant Magnetocaloric Gd₅(Ge_{1-x}Si_x)₄ Alloys," *Phys. Rev. Lett.* 98, 247205 (2007). DOI: 10.1103/PhysRevLett.98.247205

Author affiliations: ¹Argonne National Laboratory, ²Ames Laboratory, Iowa State University.

Correspondence: haskel@aps.anl.gov

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See also: "Giant Magnetocaloric Materials Could Have Large Impact on the Environment," <http://www.aps.anl.gov/Science/Highlights/2007/20070611.htm>



Researchers in this study from Argonne, Aristotle University of Thessaloniki, and the Chemical Process Engineering Research Institute carried out experiments at the Materials Research Collaborative Access Team beamline 10-ID at the APS.

See: V.G. Komvokis¹, E.F. Iliopoulou², I.A. Vasalos², K.S. Triantafyllidis¹, C.L. Marshall³, "Development of optimized Cu-ZSM-5 deNO_x catalytic materials both for HC-SCR applications and as FCC catalytic additives," *Applied Catalysis A: General* 325, 345 (2007).

Author affiliations: ¹Aristotle University of Thessaloniki, ²Chemical Process Engineering Research Institute, ³Argonne National Laboratory

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See also: M.K. Neylon, M.J. Castagnola, N.B. Castagnola, C.L. Marshall, "Coated bifunctional catalysts for NO_x SCR with C3H6 Part I: water-enhanced activity," *Catalysis Today* 96(1-2), 53 (2004); and M.J. Castagnola, M.K. Neylon, C.L. Marshall, "Coated bifunctional catalysts for NO_x SCR with C3H6 Part II. In situ spectroscopic characterization," *Catalysis Today* 96(1-2), 61 (2004).

And: "New Catalyst Helps Eliminate NO_x,"

http://www.anl.gov/Media_Center/News/2007/CMT070427.html