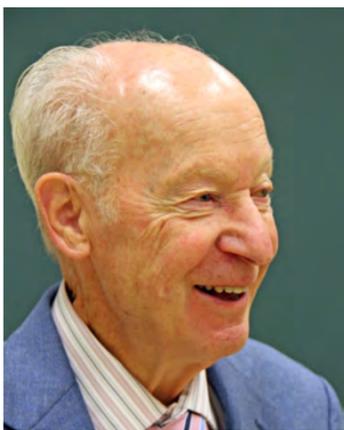


ECE DISTINGUISHED SPEAKER SERIES



Karl Gschneidner

Professor, Department of Materials Science and Engineering at Iowa State University

Host: Professor Vincent Harris
(harris@ece.neu.edu)

Magnetic Refrigeration

Thursday

September 26, 2013

Room 378 in 140 The Fenway

4:00-5:00 pm

Reception to follow

*Sponsored by the
Department of Electrical
and Computer Engineering*

Magnetic Refrigeration —a 21st Century Highly Efficient and Green Cooling Technology

Karl A. Gschneidner, Jr., Yaroslav Mudryk,
and Vitalij K. Pecharsky

**Ames Laboratory, U.S. DOE and Department of
Materials Science and Engineering
Iowa State University
Ames, Iowa USA**

Magnetic refrigeration (MR) offers the promise of improved energy efficiencies to be competitive with and eventually replace conventional gas-compression refrigeration technologies. The success of MR to become a viable cooling technology is to be able to utilize materials which exhibit a first order magnetic transition, i.e. giant magnetocaloric effect (GMCE) materials. The GMCE phases have a magnetic entropy change twice as large as that of a normal MCE substance. All GMCE materials exhibit a large volume change from ~1% up to ~4% at the magnetic transition temperature, and most are intermetallic compounds. However, the major challenge is finding ways to make the GMCE materials robust so they do not attrite during the lifetime of a MR device (~17 years), as they undergo a billion cycles of magnetization and demagnetization, and concomitant heat exchanger fluid flows at 4Hz.

*This research was supported by the U.S. Department of
Energy, Office of Basic Energy Sciences.*

Karl Gschneidner is an Anson Marston Distinguished Professor in the Department of Materials Science and Engineering at Iowa State University, and a Senior Metallurgist of the Ames Laboratory, U. S. Department of Energy. He was the founding Director of the Rare-earth Information Center from 1966 to 1996.

Gschneidner received a B.S. degree from the University of Detroit in 1952 and his Ph.D. from Iowa State University in 1957. He was at the Los Alamos National Laboratory from 1957 to 1963 and joined Iowa State University in 1963.

Gschneidner is considered the world's foremost authority of rare earth science, technology, application and utilization. He has published over 502 papers in peer reviewed journals, holds 15 patents (plus 4 pending), and given 318 invited presentations. He retired in 2011 as the founding and senior editor of the 41 volume series of the *Handbook on the Physics and Chemistry of Rare Earths*.

He was elected to the National Academy of Engineering in 2007 for "contributions to the science and technology of rare-earth materials", and received over 25 awards and honors, including Fellowships in 5 professional societies. Gschneidner was named the 2000 University of Detroit Mercy's Science Alumnus.



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