

**February 12, 2009**  
Hyatt Regency  
575 Memorial Drive, Cambridge, MA

## **The Role of Nuclear Power in Our Energy Future**



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**Abstract** Upon the introduction of commercial nuclear reactors in the 1950s the power produced was billed as being “too cheap to meter” (Straus). Indeed, that promise was not made in jest, as the cost of uranium was low, the risks were not fully appreciated, nuclear weapon proliferation was considered to be an academic interest, and the irrational objection to nuclear power had not yet developed. Over the past sixty years, the cost of uranium has risen dramatically, the risks have been illustrated by Chernobyl and to a lesser extent by Three Mile Island, the nuclear weapons club has increased dramatically with even small, impoverished nations joining the ranks, and the anti-nuclear lobby has not waned in its objections. Notwithstanding these factors, nuclear power has demonstrated itself to be a technical marvel; a system that is capable of producing more fuel than it consumes, rendering the fuel resources to be almost limitless, and which is accessible by rich and poor nations alike. With the eventual introduction of fusion power, many, but not all of the objections to nuclear power are likely to disappear, but the best estimates put the large scale use of fusion reactors many decades away. In this presentation, I will review the various types of fission and fusion reactors that exist, the technologies upon which they are based, and the prospects for their use in the future energy economy. In particular, I will identify and review the technical challenges that exist in the development of safe, economic fission and fusion reactors that will make their proper contributions to the World’s energy supply.

Also this evening,

David Krashes, Trustee of the **ASM Materials Education Foundation**  
Will be speaking about the Foundation

**Reservations, by 11/18**

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**Time**

Social 6:00

Dinner: 6:30

Speaker: 7:30

**Cost**

Student, ASM member \$15

Student, non-member \$18

ASM member \$28

Non-member \$35

**Our Speaker** Prof. Digby D. Macdonald, FASM, is director of the Center for Electrochemical Science & Technology and a professor of materials science and engineering at Pennsylvania State University, University Park.

A native of New Zealand, Dr. Macdonald became a U.S. citizen in 1984. Prior to joining Penn State in 1991, he was director of the chemistry laboratory (1984–87) and materials laboratory (1987–91) at SRI International (formerly Stanford Research Institute), Menlo Park, Calif. During this latter period, he also served as deputy director of the SRI Physical Sciences Division. More recently, while on leave from Penn State, he served as vice president of the SRI division. From 1979–84, he served as a professor of metallurgical engineering and director of the Fontana Corrosion Center at Ohio State University, Columbus.

Dr. Macdonald received the Whitney Award from NACE International (1992) and the Wagner Award from the Electrochemical Society (1993), and was chosen by Atomic Energy of Canada Ltd. to deliver the 1993 W.B. Lewis Lecture in recognition of his “contributions to the development of nuclear power in the service of mankind.”

He is also a fellow of NACE International, the Electrochemical Society, the Royal Society of New Zealand, and the Royal Society of Canada. Dr. Macdonald has written a book and more than 570 papers on thermodynamics, electrochemistry, corrosion science, chemistry, and materials science. He holds B.Sc. and M.Sc degrees from the University of Auckland, New Zealand, and a Ph.D. from the University of Calgary, Alberta, Canada.