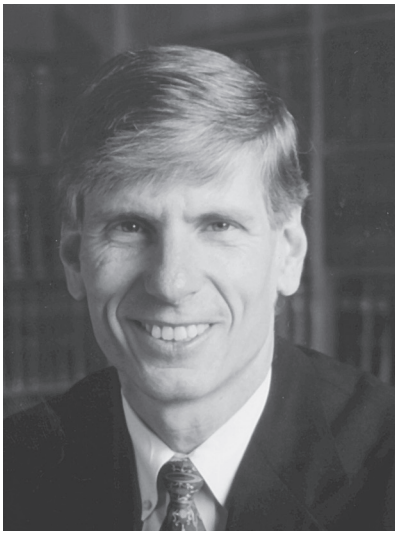

A Trip to Mars

I love a grand challenge. Watching Neil Armstrong's first steps on the Moon was like seeing a baby born. You just couldn't believe such a thing was happening. The lunar landing completed John F. Kennedy's grand challenge for the 1960s, and the mission brought out the best of science and engineering, as well as the explorer in each of us. In his recent State-of-the-Union address to Congress, U.S. President Bush gave his own grand challenge of putting a human on Mars. Throughout history, exploration has brought us some of our most thrilling moments. Imagine the excitement when Marco Polo returned to Europe with his first accounts of China. His peaceful expedition in the late thirteenth century not only inspired his contemporaries, it also encouraged generations to come. Marco Polo's writings provided the inspiration for Christopher Columbus and other explorers.

The conviction behind President Bush's grand challenge has yet to materialize. The recent international missions to Mars show there is the interest and technology to consider such a challenge. However, many scientific, engineering, and financial obstacles remain.

Last year, President Bush presented a potentially and even more profound, yet less glitzy, grand challenge to the electrochemical community—an economical fuel cell. President Bush spoke of the benefits of a hydrogen powered device during his 2002 State-of-the-Union message. Imagine how different the world would be if we all had a fuel cell powered electric car getting 100 mpg. In addition to the obvious benefits from drastically cutting oil usage, the car would be quiet and nonpolluting. Like Marco Polo's handbook for future explorers, the fuel cell could provide us with a roadmap to a lower-power-density future. The ready availability of high-powered engines causes excessive waste. There is a real danger that the wasteful, high-power option will be emulated and adopted by developing regions when the resources become available, rather than more efficient options. To be sure, the scientific and engineering challenges are substantial, perhaps approaching those of a Mars landing. While all of the Gibbs Energy is potentially available in a fuel cell (compared to less than half of the enthalpy in a traditional turbine-based heat engine) we are far from tapping the fuel cell's full potential. The low rate of reaction, problems with membranes, and lack of infrastructure for the proper fuel are but some of the challenges.

We are yet to see a real move toward a manned mission to Mars. A one percent increase in NASA's budget won't get us far. The 2002 fuel cell grand challenge has been equally disappointing. The moment seems to have dissipated without impact or significant results. The resources have been diverted elsewhere leaving the large-scale fuel cell an empty promise. As much as a manned mission to Mars would be thrilling, a realistic fuel cell would have far more benefits to humans. We can only hope that the fortitude to face the grand challenge of a viable fuel cell still exists.

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