The cost of solar electricity generation has decreased dramatically over the last few years yet the ability to store solar energy in a cost effective still limits the larger scale integration of this renewable resource. Photoelectrochemical water splitting to produce hydrogen from water, a clean renewable fuel, has been the subject of intensive research throughout the world to address this issue. In this talk I will review the progress in this area both at Wyoming and in other large world-wide research efforts. I will also discuss an alternative solar electricity storage idea. Some of our recent research on photoelectrochemical process on the surface of Mars that may explain both the surprising discovery of large amounts of perchlorate in the surface soil and the loss of water, thought to have been abundant in early Mars history, will also be presented.

Bruce Parkinson received his BS in chemistry at Iowa State University in 1972 and his PhD in chemistry from Caltech in 1977 and was a post-doctoral scientist at Bell Laboratories in 1978. He then spent time at the Ames Laboratory and the Solar Energy Research Institute (now known as the National Renewable Energy Laboratory) in Golden, Colorado. He moved to the Central Research and Development Department of the DuPont Company in 1985 and in 1991 he became Professor of Chemistry at Colorado State University until his departure in 2008 to join the Department of Chemistry and the School of Energy Resources at the University of Wyoming. His current research covers a wide range of areas including materials chemistry, surface chemistry and photoelectrochemical energy conversion on both Earth and Mars. He is a Fellow of the American Association for the Advancement of Science and the Electrochemical Society and has more than 225 peer-reviewed publications plus 5 US patents. He recently was awarded a Humboldt Research Prize from the German Humboldt Society.