



## Here Comes the Sun King

"Everybody is laughing ...everybody is happy ... here comes the Sun King." Remember this Lennon-McCartney composition in the Beatles' 1969 album, *Abbey Road*? Well, it does appear that solar power is poised to become king again from among the available options for renewable energy. Photovoltaic (PV) solar cells, in particular, have been enjoying a quiet resurgence worldwide since the 1990s. These devices use semiconductors to directly convert sunlight into electricity with no moving parts. Their simplicity, reliability, and favorable power-to-weight ratio have made them the preferred technology

since the 1950s for powering satellites in space. Indeed, almost all of today's satellites obtain their electrical power from solar cells. On the other hand, photovoltaics have been considered for terrestrial applications only for the past 30 years or so. Unlike their space counterparts, for PV solar cells in the generation of electricity on the earth's surface, weight is much less of an issue and cost becomes much more important.

Cost has been the single factor in limiting the contribution of PV electricity to the world's energy mix. At present, PV power modules and systems simply cost too much to compete effectively with conventional (fossil-derived) electricity from the utility grid. This situation may change in the future. In fact, many experts believe that PV electricity will be economical for homes and businesses around the world by 2010 and could provide *ca.* 10-15% of the world's energy needs by 2050 (*Chemical & Engineering News*, June 21, 2004, p. 25). It is worth noting, however, that the U.S. is presently lagging behind other countries (notably Japan) in PV electricity production. Whether this scenario will change in the future will hinge on the price tag that this country is willing to assign for fossil fuel emission problems and climate change. Without government subsidies, it is difficult to see how the PV sector can grow significantly in the U.S. in the near future. Unfortunately enough, a catastrophic event can change this scenario as happened during the Arab oil embargo in the 1970s.

A silver lining in the clouds for solar energy is the possible emergence of a hydrogen economy—the topic featured in this special issue of *Interface*. Solar energy can play a crucial role in the production of hydrogen from water. However, much R&D remains to be done on this topic before we can reap practical benefits. In this respect, it is encouraging that substantial funding resources are now being allocated by U.S. federal and state agencies toward the Hydrogen Fuel Initiative. Other countries are also taking similar steps. I recently attended the International Conference for the Photoconversion and Storage of Solar Energy (IPS-15) where many papers from laboratories around the world reported impressive developments in solar hydrogen production.

The Electrochemical Society has played an active role in fostering solar PV and related technologies (*e.g.*, fuel cells) and the symposia planned on these topics for the meetings in Honolulu, Hawaii and Quebec City, Canada, exemplify this role. We hope that the three feature articles in this volume illustrate how the ECS community can further contribute to energy R&D and the hydrogen economy. John Turner, Guest Editor, took the lead and Beth Opila, Chair, High Temperature Materials Division, provided crucial input. I would also like to thank Eric Wachsmann, Mark Williams, and Giselle Sandi for their contributions. Stay tuned.

Raj K.

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Editor

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