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Preface

2013 2nd AASRI Conference on Power and Energy Systems (PES 2013) will be held on December 27-28,2013, Jeju Island,Korea.

PES 2013 will be the most comprehensive conference focused on the various aspects of Business, Economics and Management. Our conference provides a chance for academic and industry professionals to discuss recent progress in the area of Power and Energy Systems.

The ‘frontier challenge’ of using energy source poses daunting challenges—scientific, technological, socio-economic and socio-political. For example, we urgently need new materials to capture the power even more cheaply and easily, and new and innovative solutions to the vexing problems of collecting, converting and delivering power.

This Discussion Meeting provided a lively forum to critically assess many of the intertwined scientific and technological issues relating to power. We attempted to target most of the frontier challenges in power research to identify the dominant scientific and technical barriers to large-scale implementation of energy as a competitive energy source—and a sustainable energy source at that—to provide a significant fraction of global energy by the mid-twenty-first century.

Finding a global energy system based on power as input and electricity and chemical fuels as outputs requires innovative research and technology that is naturally multi-disciplinary. Speakers at the Discussion Meeting were drawn from physics, chemistry, materials science, biology and engineering. Such combined expertise and experience will be critical to advance new scientific knowledge that will lead to new technologies in the harvesting, capture, storage and utilization of power. Multi-disciplinary challenges that were highlighted included: power in the context of energy usage and transportation, assessments of state-of-the-art silicon, polymer, nanostructured and second-/third-generation cells, hydrogen and other fuels, concentrated thermal power and new insights from natural photosynthesis. The Discussion Meeting also included a vision of power's potential in the European Union as well as summary overviews of new photovoltaic technologies and the production of energy-rich chemical fuels—aspiring artificial photosynthesis. These subjects will help set the agenda for the future of power.

We must have no delusions about the area required for large-scale power; about the challenges of transmitting energy over large distances; about the additional costs of handling intermittency; and about the need for breakthroughs not only in the whole-system costs of photovoltaic but also in the cost of systems for storing energy’. Some of these enormous social and political implications of energy technologies were partly explored in the Discussion Meeting; these will obviously need to be fully discussed in an adequate forum. However, with that broader discussion still emerging, the present proceedings critically summarize the state-of-the-art key challenges and future priorities of research and technologies in power for the next decades. We believe that this Discussion Meeting Issue will serve as a useful basis for advancing power as a renewable energy source.

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Wei Deng