Preface

Since the apparition of the coming energy crises and increased awareness of climate change, various avenues are being explored to replace fossil fuels, with renewable energy from solar power and biomass sources as the most promising. In the last decade, the development of advanced molecular materials and nanotechnologies has initiated a new set of ideas that can dramatically improve energy conversion efficiency and reduce prices of alternative energy sources. It was therefore timely to launch a new initiative as the organization of the interdisciplinary International Conference "Molecular and Nanoscale Systems for Energy Conversion" (MEC-2007), devoted to new research trends in different areas of alternative energetic sources. This event was the first scientific meeting in Russia dealing with the general problems and future challenges in renewable energy conversion.

The Conference was held on 1–3 October 2007 in Moscow at the Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, under the sponsorship of the International Union of Pure and Applied Chemistry (IUPAC), the Russian Academy of Sciences, Lomonosov Moscow State University, and the Russian Foundation for Basic Research. The Conference featured 11 oral sessions and a general poster session, which was held throughout the entire duration of the event.

Over 200 researchers from 11 countries, including 90 students, participated in the event. The presentations of the latest discoveries included 85 contributed papers and 12 plenary and 9 keynote lectures covering 4 topics: (i) advanced systems for photovoltaics, (ii) new types of fuel cells, (iii) biofuels, and (iv) molecular and nanoscale systems for energy conversion. All submitted abstracts were reviewed by the International Program Committee.

In this issue of *Pure and Applied Chemistry* we introduce a selection of papers based on plenary and keynote lectures delivered at MEC-2007. This volume contains: a discussion of light intensity, as one of the most important factors influencing solar energy conversion (S. D. Varfolomeev, Russia); a viewpoint on future directions in photovoltaics as a new challenge for chemical physics (O. Shevaleevskiy, Russia); a description of new Cu(In,Ga)Se_2 (CIGS) solar cells (B. T. Ahn, South Korea); a description of metal cluster-like materials for the molecular oxygen reduction reaction (N. Alonso-Vante, France); an application of biogas and microbial fuel cell technologies for anaerobic digestion of wastes (S. V. Kalyuzhnyi, Russia); a description of light energy conversion mechanism in dual fluorophore–nitroxide molecules (G. I. Likhtenshtein, Israel); an overview of dangling-bond (DB) defect behavior in nanocrystalline silicon-based films for photovoltaics (K. S. Lim, South Korea); and an approach to the design of low-bandgap polymer solar cells (D. Yu. Paraschuk, Russia). All of the contributions exemplify the participants' broad range of interests and characterize the new challenges in the area of renewable energy sources.

Sergey Varfolomeev and Oleg Shevaleevskiy
Conference Editors