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**Biological and Synthetic Polymer
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Preface

This volume contains the text of selected presentations from the Polymer Networks 2004 Conference (17th Polymer Networks Group Meeting) held in Bethesda, MD, from August 15–19, 2004. The conference was jointly organized and sponsored by the National Institutes of Health and the National Institute of Standards and Technology under the auspices of the IUPAC.

Polymer science is by nature an interdisciplinary field, traditionally spanning chemistry, physics and engineering. One of the most promising new developments in polymer science is the interaction with other disciplines such as biology and medicine. The goal of the Polymer Networks 2004 Conference was to provide an interdisciplinary forum for physical scientists, engineers, biologists, and clinicians to meet and discuss their work, exchange ideas, and assess the latest developments in the rapidly expanding field of polymer gels and networks. The most recent advances from eight topical categories were presented and discussed. These topics were: Phase Transition in Synthetic and Biopolymer Gels, Associating/Self-Assembly Systems, Polyelectrolytes and Intelligent Gels, Controlled Synthesis of Networks, Tissue Engineering and Hydrogel Scaffolds, Nano-Particles in Diagnostics and Therapeutics, Gene and Drug Delivery, and Simulation and Modeling of Polymer Networks.

The conference focused on all areas relevant to the formation, structure, properties and applications of synthetic and natural polymer networks and gels, including materials science, nanotechnology, surface science, rheology, tissue engineering, and modeling. In particular, the conference explored experimental tools and theoretical models to describe biological phenomena with physical concepts that allow predictive, model-driven research. This knowledge is essential for understanding, designing, and controlling material properties and performance. The collection of papers in this volume illustrates that increased understanding of the behavior of complex gel systems is critical to developments in biomedical research, biotechnology, diagnostics, dentistry, and medicine.

We thank the authors of the papers for their invaluable contributions to this exciting volume. We also acknowledge the colleagues who reviewed the manuscripts, as well as the staff of the *Macromolecular Symposia*. We would like to express our gratitude to the members of the Advisory Board and the Organizing Committee for their excellent work before and during the conference.

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