Preface

Energy transduction phenomena occurring in macromolecular materials offer ample opportunities to conceive and implement innovative and, in some instances, unique devices for sensing and actuation.

Despite the tremendous opportunities available for engineering developments, this field of study is still quite marginal and the impact of polymer devices in current technology is very limited.

There are several reasons for this slow technical progress. The typically poor stability and durability of polymer devices compared with their inorganic counterparts are clearly an engineering concern; however, these aspects, together with the primitive stage of fabrication technology also resulting in scarce material and device reproducibility, are the consequences not the causes of limited development. More fundamental causes reside, in the opinion of the Editors of this book, on one hand in educational inadequacies of engineering curricula (particularly in electronic engineering) in the field applied polymer science and, on the other hand, on the scarce inclination of polymer chemists and physicists to realize demonstration devices using sound design principles.

In the field of polymer sensors and actuators additional factors limiting the development are definitely linked to the complex properties of macromolecular systems which imply high technical risks and, often, relatively high development costs.

These factors are today a deterrent to industrial initiatives since the expected market, although globally large, is projected to be fragmented into many small niche products.

Notwithstanding the above difficulties, scientific progress in this area has been substantial in the last decade and this book has been designed to provide an up-to-date reference text to postgraduate students and researchers in the field.

The tutorial approach used in writing the different chapters, which cover chemistry, physics and engineering aspects, is also thought to be fruitful for scientists and engineers entering the field.

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Yoshihito Osada
Danilo De Rossi

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List of Contributors

Bailey, Richard A.
Department of Instrumentation and Analytical Science, PO Box 88, UMIST, Manchester, M60 1QD, UK

Baldini, F.
Istituto di Ricerca sulle Onde Elettromagnetiche "Nello Carrara", CNR, Via Panciatichi 64, I-50127 Firenze, Italy (e-mail: baldini@iroe.fi.cnr.it)

Barsi, L.
Department of Physical Chemistry, Techinical University of Budapest, 1521 Budapest, Hungary

Bracci, S.
Centro di Studio sulle Cause di Deperimento e Metodi di Conservazione Opere d'Arte, CNR, Via G. Capponi 9, I-50121 Firenze, Italy (e-mail: bracci@cscoa.fi.cnr.it)

Brehmer, L.
Universität Potsdam, Institut für Physik, Physik kondensierter Materie, Postfach 601653, D-14415 Potsdam, Germany (e-mail: Brehmer@rz.Uni-Potsdam.de)

Das-Gupta, Dilip K.
University of Wales, Bangor, School of Electronic Engineering and Computer Systems, Dean Street, Bangor, LL57 1UT, UK (e-mail: dilip@sees.bangor.ac.uk)

Della Santa, A.
University of Pisa, Centro "E. Piaggio", Faculty of Engineering, Via Diotisalvi 2, 56100 Pisa, Italy

De Rossi Danilo, E.
University of Pisa, Centro "E. Piaggio", Faculty of Engineering, Via Diotisalvi 2, 56100 Pisa, Italy (e-mail: derossi@anaxagoras.piaggio.ccii.unipi.it)

Gong J.P.
Division of Biological Sciences, graduate School of Science, Hokkaido University, Sapporp 060, Japan

Hirai, Mitsuhiro
Faculty of Engineering, Gunma University, Aramaki-cho 4-2, Maebashi-shi 371, Japan

Hirai, Toshihiro
Faculty of Textile Science and Technology, Shinshu University, Tokida 3-15-1, Ueda-shi 386, Japan (e-mail: tohirai@giptc.shinshu-u.ac.jp)

Ikeda, Atsushi
Department of Chemical Science and Technology, Faculty of Engineering, Kyushu University, Hakozaki, Fukuoka 812, Japan

Mazzoldi, A.
University of Pisa, Centro "E. Piaggio", Faculty of Engineering, Via Diotisalvi 2, 56100 Pisa, Italy

Kishi, Ryoichi
Functional Soft Materials Group, Department of Polymer Engineering, National Institute of Materials and Chemical Research, Tsukuba, Ibaraki 305, Japan (e-mail: kishi@nimc.go.jp)

Kodama, Takao
Laboratory for Molecular Enzymoology, Kyushu Institute of Technology at Iizuka, Fukuoka, 820 Japan

Osada, Yoshihito
Division of Biological Sciences, Graduate School of Science, Hokkaido University, Sapporo 060, Japan (e-mail: osada@indy.polymer.hokudai.ac.jp)

Otero, Toribio Fernández
Universidad del Pais Vasco, Facultad de Quimica, Laboratorio de Electroquimica, P.O. Box 1072, 20080 San Sebastian, Spain

Persaud, Krishna C.
Department of Instrumentation and Analytical Science, PO Box 88, UMIST, Manchester, M60 1QD, UK (e-mail: kcpersaud@umist.ac.uk)

Sakai, Yoshiro
Department of Applied Chemistry, Faculty of Engineering, Ehime University, 3, Bunkyo-cho, Matsuyama-shi, Ehime-ken. 790, Japan
(e-mail: sakai@en3.ehime-u.ac.jp)

Shahinpoor, Mohsen
Artificial Muscles Research Institute, School of Engineering & School of Medicine, University of New Mexico, Albuquerque, NM 87131, USA
(e-mail: Shah@mail.unm.edu)

Shinkai, Seiji
Department of Chemical Science and Technology, Faculty of Engineering, Kyushu University, Hakozaki, Fukuoka 812, Japan
(e-mail: seijitcm@mbox.nc.kyushu-u.ac.jp

Suzuki, Makoto
Department of Metallurgy, Tohoku University, Sendai 980-8579 Japan;
National Institute for Advanced Interdisciplinary Research, AIST, 1-1-4 Higashi,
Tsukuba, 305 Japan (e-mail: msuzuki@material.tohoku.ac.jp)

Szabó, D.
Department of Physical Chemistry, Techinical University of Budapest, 1521 Budapest,
Hungary

Takeuchi, Masayuki
Department of Chemical Science and Technology, Faculty of Engineering,
Kyushu University, Hakozaki, Fukuoka 812, Japan

Vincent, Julian F.V.
Centre for Biomimetics, 1 Earley Gate, Reading, RG6 6AT, UK
(e-mail: szsvinct@reading.ac.uk)

Zrínyi, M.
Department of Physical Chemistry, Techinical University of Budapest, 1521 Budapest,
Hungary (e-mail: zrinyi@ch.bme.hu)

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