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## Preface

Over the past 25 years or so there has been a revolution in the development of functional polymers. While many polymers as commodities represent huge markets, new materials with a high degree of functionality have been developed. Such specialty polymers play important roles in our day-to-day lives. The current volumes 213 and 214 of *Advances in Polymer Science* focus on photoresponsive polymers. In particular polymers that can either change the properties of a beam of light that passes through them or who change their properties in response to light. Volume 213 starts with an introduction to two-photon absorption by Rumi, Barlow, Wang, Perry, and Marder. In this chapter they develop the basic concepts of two-photon absorption, and describe structure–property relationships for a variety of symmetrical and unsymmetrical molecules. The applications of these materials in 3D microfabrication of polymers, metals, and oxide materials are detailed in the chapter entitled “Two-Photon Absorber and Two-Photon Induced Chemistry” contributed by the same group of authors. Then Belfield, Bondar, and Yao describe the molecules, dendrimers, oligomers, and polymers that can be excited by two-photon absorption and their application in processing materials with three-dimensional spatial control in their chapter entitled “Two-Photon Absorbing Photonic Materials.” Specifically they describe the development of symmetrical and polar conjugated materials for two-photon absorption and their use as photo-initiators for 3D microfabrication. Juodkazis, Mizeikis, and Misawa also explore multiphoton processing of materials in their chapter, and provide more focus on the processing aspects of these materials and discuss the state-of-the-art in resolution.

In Volume 214, Hoppe and Sariciftci describe how organic semiconducting polymers can be used to produce electrical power when excited by light in the chapter entitled “Polymeric Photovoltaic Devices.” In particular the authors review approaches based upon blends of conjugated polymers with small molecules that are approaching a point where they can be considered for commercialization. This is followed by a chapter by McGrath and D’Ambruso entitled “Energy Harvesting in Synthetic Dendritic Materials” where they describe dendritic materials that can absorb light across various parts of the UV–visible spectrum and funnel energy down to a low energy absorber, which can be useful for a variety of applications including photovoltaics. Finally,

Baldeck and Andraud provide a chapter entitled “Exitonic Coupled Oligomers and Dendrimers for Two-Photon Absorption,” wherein the concepts of excitonic coupling are developed and their relevance to multi-photon absorption processes are described.

The editors hope that these volumes will provide the reader with an overview of various aspects of photoresponsive polymers. We recommend that readers also examine other volumes in this series to learn more about related topics. In addition the editors thank the authors of the chapters in these volumes and the staff of Springer for their contribution to these volumes and accept responsibility for any errors or inaccuracies.

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