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A review of: "Primary Photoexcitations in Conjugated Polymers: Molecular Exciton versus Semiconductor Band Model, edited by N.S. Sariciftci; ISBN 981-02-2880-5: World Scientific Publishing Co. Pte. Ltd., 1997; xv + 621 pages; $ 86.00"

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Book Review

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"Primary Photoexcitations in Conjugated Polymers: Molecular Exciton versus Semiconductor Band Model" edited by N.S. Sariciftci; ISBN 981–02–2880–5; World Scientific Publishing Co. Pte. Ltd., 1997; xv + 621 pages; $ 86.00

This book contains twenty chapters that the editor hopes will cover all sides of the arguments concerning the nature of the primary photoexcitations in conjugated polymers. As noted by the editor, the book was put together in less than one year after invitations to write were issued. For this, the editor is to be congratulated.

The question of what is formed in a conjugated polymer after initial photoexcitation, an exciton or a charge-separated polaron pair, is the focus of this book. Central to this discussion is the magnitude of the exciton binding energy. This quantity was estimated at 0.5 eV in polydiacetylenes (PDA), both in single crystals and films coated from solution. This information about PDA is repeated in numerous chapters in the book. This repetition of information on several topics is acknowledged by the editor in the preface as necessary for self-contained chapters. In contrast to PDA, other conjugated polymers not available in fully crystalline form, especially poly phenylenevinylenes (PPV) behave as if they have an exciton binding energy close to zero. The question of the magnitude of the exciton binding energy in PPVs is also extensively discussed, as estimates vary from close to zero up to 1 eV.

The magnitude of the exciton binding energy is not the only topic where the reader will find markedly different interpretations. For example (p. 33): "Franz-Keldysh type oscillations have not been reported for conjugated polymers." With reference to certain PDA crystals (pp. 357–358): "The small mass allows to observe field broadening of a few Franz-Keldysh oscillations in samples where the coherence length exceeds 150Å."

The book consists of twenty chapters by authors from the U.S., Europe, and Japan. Six chapters are primarily theoretical and two are devoted to oligomers.

References are given at the end of each chapter, but there is no index. Readers familiar with other recent reviews written by several of the authors will find significant overlap in this book.

Each chapter contains sufficient introductory material so as to be useful to both beginning students as well as experienced professionals. The reader will get a summary of the various opinions related to electronic excitation in conjugated polymers at the time the book was written. Hopefully additional experimental and theoretical work, especially involving better, more structurally ordered, samples will allow present disagreements to begin to be resolved. Overall, this book is a useful contribution to the literature of conjugated polymers in their insulating form.

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