

Preface

This brief book results from the extensive work that has been done in my laboratory in the last 3 years.

As will be discussed in this brief book, a breakthrough occurs in the photovoltaic (PV) field in the last 4 years. A new material called organo-metal halide perovskite (OMHP) entered the PV field. To be completely correct, the OMHP is not a new material and already in 1990s researchers around the world (mainly from Japan) worked on characterizing this material. But the main progress related to the PV field was made at 2012 as described in more detail in this book. This year was my last year as a postdoctoral researcher in Prof. Gratzel laboratory where I was one of the pioneering researchers working with this exciting material, which results in an early publication on the use of the OMHP as light harvester and hole conductor at the same time in the solar cell.

Starting 2012 as established my current research group which have developed further the OMHP as a material and in a PV cell.

Even though just 3–4 years past from the main breakthrough with this material, I think it is the right time to summarize the basic fundamental properties and some of its exciting abilities as a fascinating material for optoelectronic applications.

This book mainly discusses our discovery that the OMHP can function as hole conductor (HTM) and light harvester in the solar cell at the same time as so-called HTM-free perovskite solar cells. It brings the ability to tune the OMHP properties (e.g., optical, physical, and electronic) and the use of the OMHP in different solar cells structures as we demonstrating the advantageous of this material on the solar cell properties.

I would like to express my appreciation to all of my students at the Hebrew University of Jerusalem who worked intensively with passion on this topic; without them, we could not make such an influenced contribution to the field. I also thank Mayra Castro from springer publisher for excellent collaboration. Finally, I would like to thank my wife and my three children for their support, happiness, and love during these years.

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