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and Devices Characterized by Conductive and Photoconductive Atomic Force Microscopy X.-D. Dang, M. Guide and T.-Q. Nguyen; 1. Introduction; 2. Basic Operation of Organic Solar Cells; 3. Fundamental Principles of Conductive and Photoconductive AFM; 3.1. Conductive atomic force microscopy; 3.2. Photoconductive atomic force microscopy; 3.3. pc-AFM devices versus bulk solar cell devices; 4. Applications of c-AFM and pc-AFM for Characterization of Organic Solar Cell Materials and Devices
4.1. Local conductivity variation and charge transport 4.2. Probing internal structure of photoactive layers; 4.3. Assigning phase separation in BHJ organic solar cells; 4.4. Local incident photon conversion efficiency; 4.5. Origin of open-circuit voltage of organic solar cells; 5. Summary and Outlook; Acknowledgments; References; Chapter 4 Kelvin Probe Force Microscopy for Solar Cell Applications T. Glatzel; 1. Introduction; 2. Experimental Technique and Working Modes; 2.1. The Kelvin Principle; 2.2. Technical realization; 3. Application to Solar Cells
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Sommario/riassunto

Efficiency and life time of solar cells, energy and power density of the batteries, and costs of the fuel cells alike cannot be improved unless the complex electronic, optoelectronic, and ionic mechanisms underpinning operation of these materials and devices are understood on the nanometer level of individual defects. Only by probing these phenomena locally can we hope to link materials structure and functionality, thus opening pathway for predictive modeling and synthesis. While structures of these materials are now accessible on length scales from macroscopic to atomic, their functionality h