

# **Photovoltaics Beyond Conventional Silicon**

## **Photovoltaics Europe 2009**

**Dresden, Germany  
7-8 April 2009**

**ISBN: 978-1-61839-008-0**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2009) by ID Tech Ex, Inc.  
All rights reserved.

Printed by Curran Associates, Inc. (2011)

For permission requests, please contact ID Tech Ex, Inc.  
at the address below.

ID Tech Ex, Inc.  
222 Third Street  
Suite 0222  
Cambridge, MA 02142

Phone: (617) 577-7890  
Fax: (617) 577-7810

[info@idtechex.com](mailto:info@idtechex.com)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>Barrier Films and Printed Electrodes for Flexible Electronics</b> .....	1
<i>B. Jannon</i>	
<b>Turn-Key-Production Line for High Efficient and Low-Cost CIGS Thin Film Modules</b> .....	35
<i>G. Ritter, D. Schmid</i>	
<b>ROTH &amp; RAU CTF Technology</b> .....	62
<i>D. Bonnet</i>	
<b>Advanced Screen-Printable Thin Film PV Front-Side Silver Conductor Composition</b> .....	94
<i>V. Arancio</i>	
<b>High Efficiency Flexible Solar Cells Based on CIGS and CdTe Thin Films</b> .....	117
<i>A. Tiwari</i>	
<b>Photovoltaic and Other Printable Functionalities Enabling Efficient Electrical Mobility</b> .....	160
<i>P. Perlo</i>	
<b>Organic Based Photovoltaics Approaching Maturity</b> .....	193
<i>M. Pfeiffer</i>	
<b>Needs &amp; Requirements for Barrier Layers for Flexible Electronics</b> .....	228
<i>H. Zervos</i>	
<b>Printed Electronics in 2009: The State of the Industry</b> .....	255
<i>R. Das</i>	
<b>Inkjet as a Digital Fabrication Process for Photovoltaic Applications</b> .....	272
<i>J. Spiers</i>	
<b>Nokia Morph - Enabling Novel Conformal Devices Through Nanotechnology</b> .....	301
<i>P. Beecher</i>	
<b>Development of Flexible Solar Cells on Textiles</b> .....	331
<i>J. Wilson, R. Mather, H. Lind</i>	
<b>Requirements for OLED Lighting in Train Applications</b> .....	351
<i>D. Czekay</i>	
<b>Power from the Sun, the Advent of Mesoscopic Solar Cells</b> .....	372
<i>M. Graetzel</i>	
<b>Thienopyrazine-based Low-Bandgap Polymers for Polymer Solar Cell Applications</b> .....	442
<i>S. Sensfuss, L. Blankenburg, H. Schache, S. Shokhovets, T. Erb, G. Gobsch, A. Herasimovich, S. Scheinert, M. Shahid, S. Sell, E. Klemm</i>	
<b>Geometry of Efficient Polymer Solar Cells</b> .....	464
<i>H. Hoppe</i>	
<b>Polymer-based Solar Cells with None-Fullerene Acceptors</b> .....	480
<i>D. Neher</i>	
<b>Screen-Printed Piezoelectric Films for Energy Harvesting</b> .....	506
<i>S. Beeby</i>	
<b>Thin Films in PV Already Penetrating the Market Status and Prospect</b> .....	537
<i>B. Dimmler</i>	
<b>High Performance Organic Solar Cells Through Enhanced Charge Transport</b> .....	557
<i>M. Aldissi, B. Ratier, A. Moliton, R. Radbeh, M. Chakaroun</i>	
<b>Author Index</b>	