

# Transparent Conductor Markets 2013

<https://marketpublishers.com/r/TE52805E8B4EN.html>

Date: August 2013

Pages: 0

Price: US\$ 1,995.00 (Single User License)

ID: TE52805E8B4EN

## Abstracts

The past year has seen major changes in the world of transparent conductors (TCs). Efforts by Intel and especially Microsoft to bring touch to every laptop have suggested new opportunities for non-ITO TCs. Meanwhile, the continued rapid growth in tablet computing can only be regarded as a positive sign for TCs.

On the other hand, new ways of producing both touch panels and displays suggest that display OEMs may be using less TC material in the future. At the same time flexible displays, OLED TVs and other applications that were supposed to generate major revenues for non-ITO TCs seem just as slow to develop as they did in 2012.

In this somewhat confusing phase of the development of TCs, NanoMarkets believes that this new report provides the necessary strategic insight into how TC firms can best generate new business revenues in the in the display, solar panel and other sectors. This report also analyzes important developments on the TC materials front and it takes a peek at what the next generation of transparent conductors will look like and how these materials will extend addressable markets.

This study also contains detailed eight-year forecasts in volume (square meters) and value terms. For each of the applications covered there are breakouts of demand for ITO, other TCOs, ITO/TCO inks, carbon nanotube films, silver-based and cooper-based transparent conductors, other nanometallic transparent conductors and conductive polymers. And there is also a forecast of ITO products by type (sputtering targets, films, coated glass, etc.). Finally, the strategies of the leading TC firms are also assessed in the context of the latest market developments.

NanoMarkets has been covering the TC market for seven years and its studies in this area are widely regarded as the most reliable insider analysis publicly available.

## Contents

### EXECUTIVE SUMMARY

- E.1 What Has Changed Since Last Year?
  - E.1.1 Touch is the All-Important Opportunity: Windows 8 versus In-Cell and On-Cell
- E.2 What the OLED Explosion Means for Transparent Conductor Makers
- E.3 Flexible Panels: Waiting for Godot?
- E.4 Will the LCD Industry Ever Open Up to Alternative Transparent Conductors?
- E.5 Better Times Ahead for Selling Transparent Conductors into the PV Space?
- E.6 Transparent Conductors: Materials and Companies to Watch
  - E.6.1 Metal Meshes: The Old Made New
  - E.6.2 Silver Nanowire Coatings: Becoming a Standard for an ITO Alternative
  - E.6.3 Still Hope for Carbon Nanotubes?
  - E.6.4 The Future of TCs: New Materials and Printing Perhaps
- E.7 Summary of Eight-Year Market Forecasts For Transparent Conductor Markets

### CHAPTER ONE: INTRODUCTION

- 1.1 Background to this Report
  - 1.1.1 Touch Everywhere: Good News for Non-ITO Transparent Conductors
  - 1.1.2 But the Latest Tech Trends from the Display Industry Should Worry the Transparent Conductor Sector
  - 1.1.3 Non-ITO TCs are at a Tipping Point
  - 1.1.4 Same Old, Same Old
- 1.2 Objectives and Scope of this Report
  - 1.2.1 Materials Covered in this Report
  - 1.2.2 Sectors Covered in this Report
- 1.3 Methodology of this Report
  - 1.3.1 Forecasting Methodology
  - 1.3.2 Assumptions About Materials Utilization, Wastage and Yields
  - 1.3.3 Cost Assumptions
  - 1.3.4 General Economic Assumptions
  - 1.3.5 Sources of Data
- 1.4 Plan of this Report

### CHAPTER TWO: RECENT TECHNOLOGY AND MARKET TRENDS FOR ITO

- 2.1 Developments in the ITO Sector

- 2.2 ITO and Flexibility Redux
- 2.3 Evolution of the ITO Marketplace in the 2012-2013 Period
- 2.4 Resistivity Issues and the Market
- 2.5 A Thought Experiment on Why ITO Price Rises Matter
- 2.6 Supply Chain Developments: ITO Glass
- 2.7 Prospects for ITO Film Markets
- 2.8 ITO Sputtering Target Markets
- 2.9 Alternatives to Sputtering: Can ITO Inks Ever Make it To Market?
  - 2.9.1 ITO Inks
- 2.10 Eight-Year Forecast of ITO Markets
  - 2.10.1 Forecast of ITO Inks
  - 2.10.2 Summary of ITO Forecasts by Type of ITO Product: Targets, Film and Coated Glass
- 2.11 Key Points Made in this Chapter

### **CHAPTER THREE: OTHER TRANSPARENT CONDUCTING OXIDES: NEW R&D, NEW USES**

- 3.1 The Arguments for Non-ITO TCOs
  - 3.1.1 Tin Oxide and its Variants
  - 3.1.2 Zinc Oxide and its Variants
- 3.2 More TCOs for the Future?
  - 3.2.1 Other Possibilities
- 3.3 Are Other TCOs Really a Drop-In Replacement?
- 3.4 Why Would PV Ever Leave TCOs?
- 3.5 Eight-Year Forecast of Non-ITO Markets
- 3.6 Key Points from this Chapter

### **CHAPTER FOUR: MARKETS FOR METAL-BASED MATERIALS AS TRANSPARENT CONDUCTORS**

- 4.1 Evolution of Transparent Conductors Using Metals
  - 4.1.1 Metallic Films: A Possibility
- 4.2 Metal Meshes
  - 4.2.1 Advantages and Potential Applications of Metal Meshes
  - 4.2.2 Disadvantages of Metal Meshes as Transparent Conductors
  - 4.2.3 Metal Meshes in PV
- 4.3 Nanowire Solutions: Cambrios and the Others
  - 4.3.1 Advantages and Applications for Silver Nanowires

- 4.3.2 Silver Nanowires: The One to Watch?
- 4.4 Are there Opportunities for Copper in the Transparent Conductor Market?
- 4.5 Eight-Year Forecast of Metal Transparent Conductor Markets
  - 4.5.1 Metal Meshes
  - 4.5.2 Silver Nanowires
- 4.6 Key Points from this Chapter

## **CHAPTER FIVE: MARKETS FOR OTHER TRANSPARENT CONDUCTING MATERIALS**

- 5.1 Other Materials
- 5.2 Conductive Polymers as Transparent Conductors: Recent Successes
  - 5.2.1 PEDOT
  - 5.2.2 Conductive Polymers in OLEDs
  - 5.2.3 Other Applications
  - 5.2.4 Eight-Year Forecast of Transparent Conductive Polymer Markets
  - 5.2.5 Cost Trends for PEDOT
  - 5.2.6 PEDOT Suppliers for Transparent Conductor Applications
  - 5.2.7 Possible Technology Developments in Conductive Polymers
- 5.3 Carbon Nanotubes as Transparent Conductors: Loser?
  - 5.3.1 The Advantages and Disadvantages of Carbon Nanotubes for Transparent Conductors
  - 5.3.2 Limiting the Carbon Nanotube: Making Them 'Just Conductors'
  - 5.3.3 Derivatization of Carbon Nanotubes
  - 5.3.4 Eight-Year Forecast of Carbon Nanotube Transparent Conductor Markets
  - 5.3.5 Changes in the Supply Structure for Carbon Nanotube Transparent Conductors
  - 5.3.6 Coda on the Future of Carbon Nanotube-Based Transparent Conductors
- 5.4 Graphene: Does it Stand a Chance in the Transparent Conductor Market?
- 5.5 Other Developments: "Fourth-Generation" Transparent Conductors
- 5.6 Eight-Year Forecast of Other Transparent Conductor Materials Markets
- 5.7 Key Points Made in this Chapter

## **CHAPTER SIX: EMERGING MARKETS FOR TRANSPARENT CONDUCTORS**

- 6.1 Touch Screen Sensors: Everyone's Favorite Opportunity
  - 6.1.1 The Shift to New Touch Module Architectures May Hurt the Prospects for Transparent Conductor Makers
  - 6.1.2 Projected-Capacitive Touch Sensors as a Market for Transparent Conductors
  - 6.1.3 The Analog-Resistive Touch Sensors as a Market for Transparent Conductors

- 6.1.4 Eight-Year Forecasts of Transparent Conductors in the Touch-Screen Sensor Industry
- 6.2 Transparent Conductors and the OLED Industry's Great Leaps Forward
  - 6.2.1 OLED Market Explodes
  - 6.2.2 How OLEDs Potentially Shrink the TC Market
  - 6.2.3 The Quest to Get Rid of ITO in OLEDs
  - 6.2.4 Eight-Year Forecasts of Transparent Conductors in the OLED Display and Lighting Market
- 6.3 Transparent Conductors for E-paper
  - 6.3.1 Varieties of E-Paper Displays and their TC Requirements
  - 6.3.2 Shifts from ITO in the E-Paper Space
  - 6.3.3 Eight-Year Forecasts of Transparent Conductors in the E-Paper Display and Lighting Market
- 6.4 Conventional Flat-Panel Displays: Stuck On ITO Forever?
  - 6.4.1 Strategies for non-ITO Transparent Conductor Firms in the LCD Market
  - 6.4.2 Eight-Year Forecasts of Transparent Conductors in the Flat-Panel Display Industry
  - 6.4.3 Notes on Transparent Conductors in Plasma Displays
  - 6.4.4 A Note on the Impact of Transparent Displays on the Transparent Conductor Market
  - 6.4.5 Flexible Electronics Mythologies and Realities: Their Impact on the Transparent Conductor Market
- 6.5 Transparent Conductors and the Future of Solar Panels
  - 6.5.1 Transparent Conductor Usage for the Thin-Film Silicon PV Sector
  - 6.5.2 Transparent Conductor Usage for CdTe PV
  - 6.5.3 Transparent Conductors in CIGS PV Market
  - 6.5.4 Eight-Year Forecasts of Transparent Conductors in the Thin-Film PV Market
  - 6.5.5 Organic PV and Dye Sensitized Cells: A Worthwhile Market for Transparent Conductor Suppliers
  - 6.5.6 Eight-Year Forecasts of Transparent Conductors in the OPV/DSC Market
- 6.6 IR and UV Protection Opportunities for Transparent Conductors
- 6.7 Antistatic Applications for Transparent Conductors
  - 6.7.1 Antistatic Markets in the Building Products Industry
  - 6.7.2 ESD Applications for the Electronics Market
  - 6.7.3 Tin Oxide as an Antistatic Coating
  - 6.7.4 Zinc Oxide as an Antistatic Coating
  - 6.7.5 Eight-Year Forecast of Transparent Conductors for Antistatic Coatings
- 6.8 Transparent Conductors in EMI/RFI Shielding
  - 6.8.1 Eight-Year Forecast of Transparent Conductors for EMI Shielding

## 6.9 Smart Windows Applications for Transparent Conductors

### 6.9.1 Low-E Windows

### 6.9.2 Solar Control Films

### 6.9.3 Electrochromic (EC) and Suspended Particle Device (SPD) Technologies

### 6.9.4 PDLC Active On-Demand Smart Windows

### 6.9.5 Thermochromic Smart Glass

### 6.9.6 Self-Cleaning Windows

## 6.10 Yet Other Markets for Transparent Conductors

## 6.11 Key Points Made in this Chapter

## List Of Exhibits

### LIST OF EXHIBITS

Exhibit E-1: Addressable Markets for non-ITO Transparent Conductors

Exhibit E-2: NanoMarkets' Perspective and Expectations of Penetration of Selected Transparent Conductor Materials

Exhibit E-3: Summary of Eight-Year Forecasts of Transparent Conductive Materials by Material Type (\$ Millions)

Exhibit E-4: Summary of Eight-Year Forecasts of Transparent Conductive Materials by Application (\$ Millions)

Exhibit 2-1: ITO in the Display BOM: A Thought Experiment (\$, except final line)

Exhibit 2-2: ITO Products in Current Use

Exhibit 2-3: Summary of Forecast of ITO by Application (\$ Millions, except for final line)

Exhibit 2-4: Summary of Forecast of ITO and TCO Inks by Application (\$ Millions, except for final line)

Exhibit 2-5: ITO Market by End-User Product Process (1) (\$ Millions)

Exhibit 3-1: Summary of Forecast of non-ITO TCOs by Application (\$ Millions, except for final line)

Exhibit 4-1: Summary of Forecast of Metal Meshes by Application (\$ Millions, except for final line)

Exhibit 4-2: Summary of Forecast of Silver Nanowires by Application (\$ Millions, except for final line)

Exhibit 5-1: Summary of Forecast of Transparent Conductive Polymers by Application (\$ Millions, except for final line)

Exhibit 5-2: PEDOS Properties

Exhibit 5-3: Summary of Forecast of Carbon Nanotube Films by Application (\$ Millions, except for final line)

Exhibit 5-4: Summary of Forecast of Other Transparent Conductive Materials by Application (\$ Millions, except for final line)

Exhibit 6-1: Why the Touch Sensor Business is Attractive for Transparent Conductor Makers

Exhibit 6-2: Important Parameters for Transparent Conductors Used for Touch-Screen Sensors

Exhibit 6-3: Forecast of Transparent Conductive Materials Demand in Touch-Screen Display Sensors

Exhibit 6-4: Forecast of Transparent Conductive Materials by Type in Touch-Screen Display Sensors

Exhibit 6-5: Long-Term Issues that ITO Faces in the OLED Market



Exhibit 6-6: Important Parameters for Transparent Conductors Used for OLED Display Electrodes

Exhibit 6-7: Forecast of Transparent Conductive Materials Demand in OLED Displays (Excludes OLED Lighting)

Exhibit 6-8: Forecast of Transparent Conductive Materials Demand by Type in OLED Displays (Excludes OLED Lighting)

Exhibit 6-9: Forecast of Transparent Conductive Materials Demand in OLED Lighting

Exhibit 6- 10: Forecast of Transparent Conductive Materials by Type in OLED Lighting

Exhibit 6-11: Important R for Transparent Conductors Used for EPDs

Exhibit 6-12: Forecast of Transparent Conductive Materials Demand in E-Paper Displays

Exhibit 6-13: Forecast of Transparent Conductive Materials by Type in E-Paper Displays

Exhibit 6-14: Important Requirements for Transparent Conductors Used for LCD Displays

Exhibit 6-15: Forecast of Transparent Conductive Materials Demand in Flat-Panel Displays (LCD and PDP)

Exhibit 6-16: Forecast of Transparent Conductive Materials by Type in LCDs and PDPs

Exhibit 6-17: Important Parameters for Transparent Conductors Used for Plasma Displays

Exhibit 6-18: Flexibility of Transparent Conductive Material Types

Exhibit 6-19: Selected Flexible Display Frontplane Technologies

Exhibit 6-20: Potential Opportunities for non-ITO Transparent Conductors in the Flexible Display Market

Exhibit 6-21: Important Parameters for Transparent Conductors Used for PV Electrodes

Exhibit 6-22: Forecast of Transparent Conductive Materials Demand in Thin-Film Photovoltaics

Exhibit 6-23: Forecast of Transparent Conductive Materials by Type in Thin-Film Photovoltaics

Exhibit 6-24: Forecast of Transparent Conductive Materials Demand in OPV/DSC

Exhibit 6-25: Forecast of Transparent Conductive Materials by Type in OPV/DSC

Exhibit 6-26: Forecast of Transparent Conductive Materials by Type in Antistatic Coatings

Exhibit 6-27: Forecast of Transparent Conductive Materials by Type in Electromagnetic Shielding



## I would like to order

Product name: Transparent Conductor Markets 2013

Product link: <https://marketpublishers.com/r/TE52805E8B4EN.html>

Price: US\$ 1,995.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

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

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/TE52805E8B4EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970