ONLINE DATABASE OF MATERIALS FOR PRINTED ELECTRONICS

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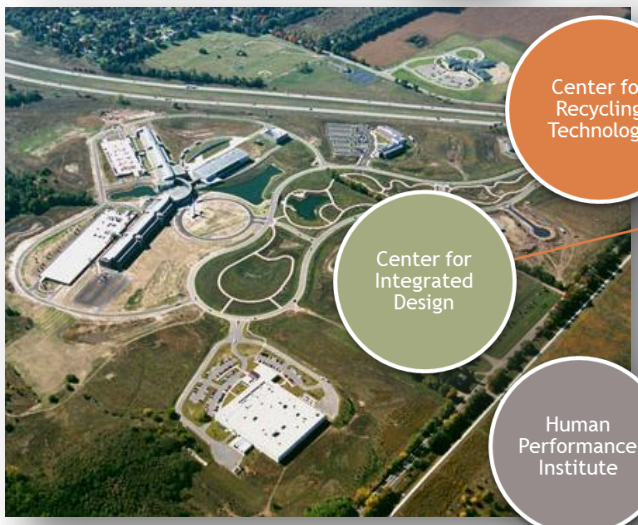
Center for Advancement of Printed Electronics at Western Michigan University



Manufacturing Research Center

Center for Advancement of Printed Electronics (CAPE)

Center for Ink and Printability

Center for Recycling Technology

CEAS Research Centers

Center for Coating Development

Center for Integrated Design

Center for Advanced Smart Sensors and Systems

Human Performance Institute

Center for Excellence in Engineering Education

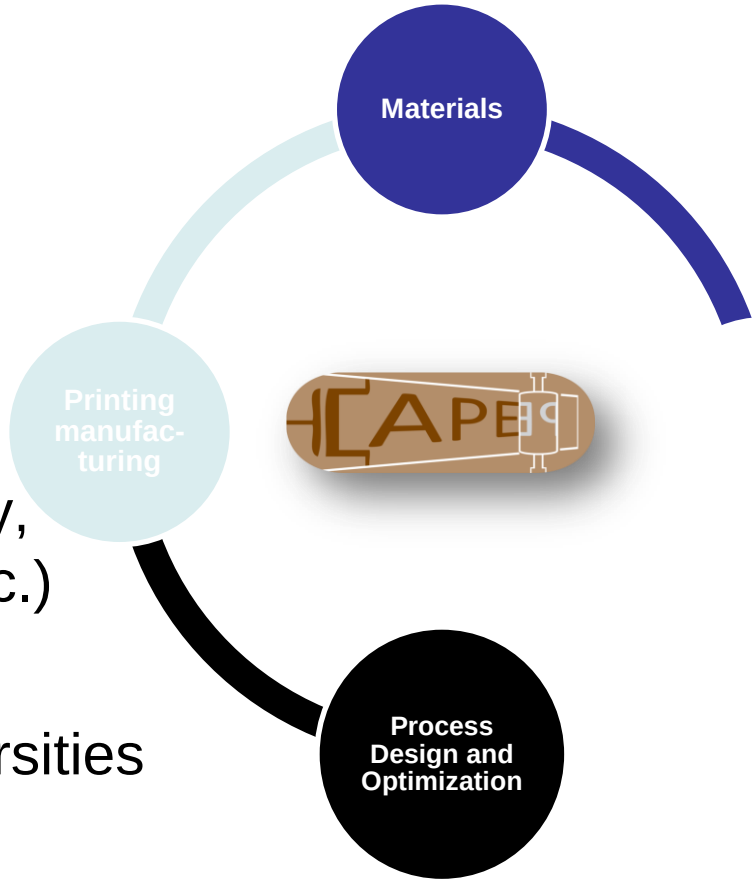
Center for Information Technology and Image Analysis

Center for Advanced Vehicle Design & Simulation

*WMU Parkview Campus at Business Technology and Research Park 343,000-sq ft facility completed in **2003***

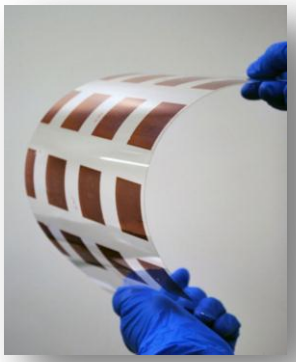
Center for Advancement of Printed Electronics

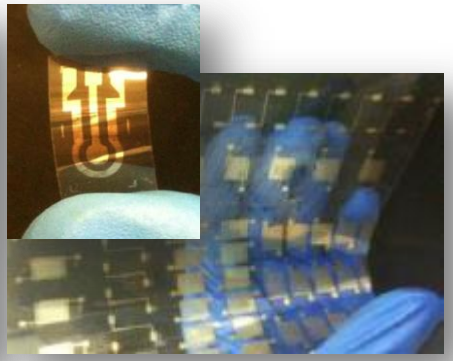
- **Purpose:** to advance the field of printed electronics by facilitating resources for research and development of relevant technologies
- **Multidisciplinary team**
- Laboratory and Pilot Scale Printing Facilities
- Extensive array of Testing Equipment (inks, substrates, surface metrology, electrical characterization, etc.)
- **Established partnerships** with industry and other universities

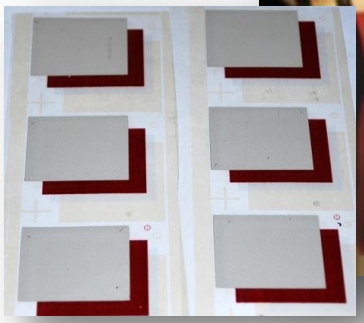


Main Activities

- Focus on fully printed devices
- Microgravure printing
- Functional ink development
- Printable Transparent Conductors (e.g. CNT, PEDOT:PSS, nanowires, ITO, etc.)
- Applications: sensors, polymer photovoltaics, TFTs, capacitors, EL, etc.







MASTERING PRINTED ELECTRONICS PRINCIPLES

- 2-days workshop with hands-on sessions at CAPE
- Presented by industry leaders and CAPE faculties
- Demonstration of AccuPress and other printing presses
- On site fabrication of simple electronic devices and their characterization

Materials Registry for Printed Electronics

- WMU's CAPE received an award from FlexTech Alliance to create an **online database** for accessing technical information on **functional materials used in manufacture of printed and flexible electronics.**

- **Purpose:**
  - provide increased access to technical information about available products – both research and commercial
  - facilitate greater visibility of material suppliers within the printed and flexible electronics supply chain.
  - strengthen printed electronics industrysupply chain

Data Management Software

- FlexTech Alliance icensed **GRANTA MI™** software by **Granta Design Limited.**
  - well known system for materials information management in engineering enterprises.
  - specifically designed to store materials properties and other data relating to materials.
  - software tools help you to control, analyze, and apply that data.

GRANTA
MATERIAL INTELLIGENCE

Materials Registry – Main Page

GRANTA MI

read mode | edit mode | home | search | report | notify | options | help | quick search

Tools

Contents

- MI Printed Electronic Materials
  - Applications
    - Subset: No Subset
    - 01. Photovoltaics
    - 02. OLED
    - 03. OTFT
    - 04. Integrated Circuits
    - 05. RFID
    - 06. Memory
    - 07. Sensors
    - 08. Batteries
    - 09. Membrane Switches
    - 10. Interconnects
    - 11. Electroluminescence
    - 12. Other
  - Barrier Coatings and Encapsulants
  - Conductive Materials
    - Subset: No Subset
    - Inorganic
    - Organic
    - Other
  - Deposition Technique
    - Subset: No Subset
    - 01. Gravure Printing
    - 02. Flexography
    - 03. Screen Printing
    - 04. Inkjet Printing
    - 05. Other
  - Dielectric Materials
  - Semiconductor Materials
  - Substrate Materials
  - Supplier Information

WMU > College of Engineering and Applied Sciences > C.A.P.E. > Materials Database

GoWMU | WMU A-Z List | Contact WMU

WESTERN MICHIGAN UNIVERSITY
Center for the Advancement of Printed Electronics

Printed Electronic Materials Database

Browse The Database:

Applications

- Photovoltaics
- Integrated Circuits
- Sensors
- Interconnects
- OLED
- RFID
- Batteries
- Electroluminescence
- OTFT
- Memory
- Membrane Switches
- Other

Materials

- Semiconductor Materials
- Conductive Materials
- Dielectric Materials
- Substrates
- Barrier Coatings & Encapsulants

Deposition Techniques

- Gravure Printing
- Flexography
- Screen Printing
- Inkjet Printing
- Other

Search The Database:

General Search

- Custom Search
- Search by Supplier

College of Engineering and Applied Sciences
Center for the Advancement of Printed Electronics
Western Michigan University
Kalamazoo MI 49008-5314 USA
Phone: 269-276-3514 | Fax: 269-276-6501

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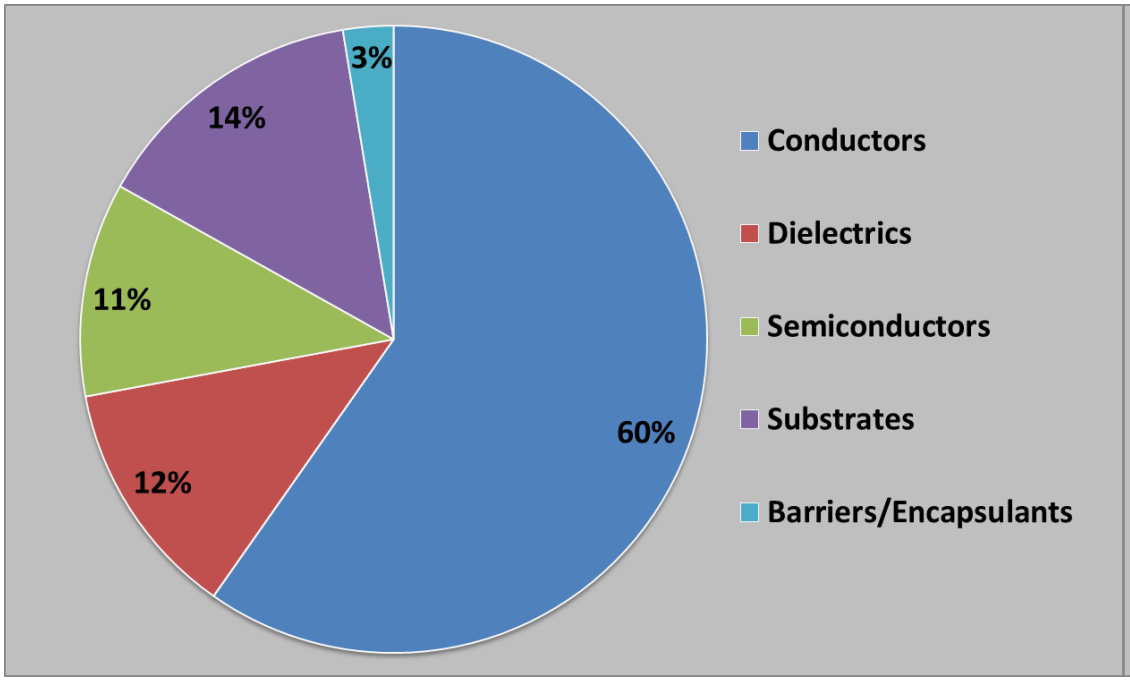
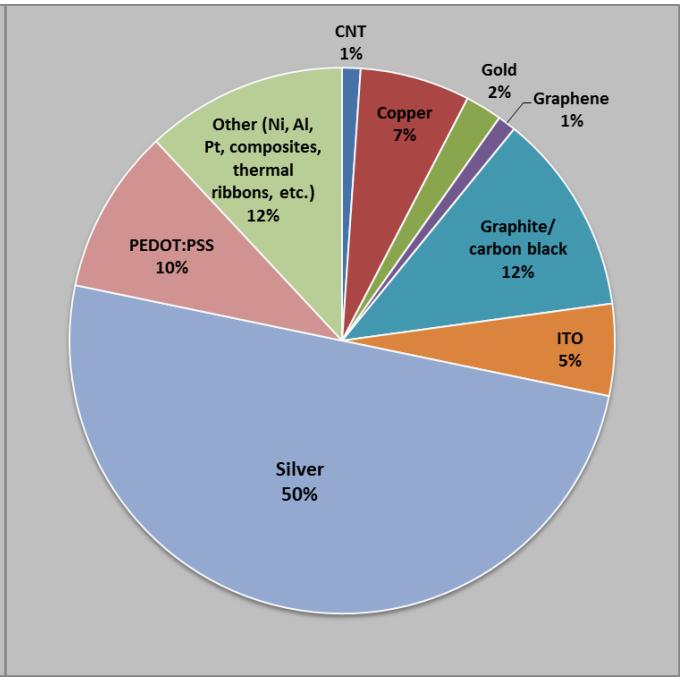
Current Status

Over 150 products uploaded to database
26+ companies participated

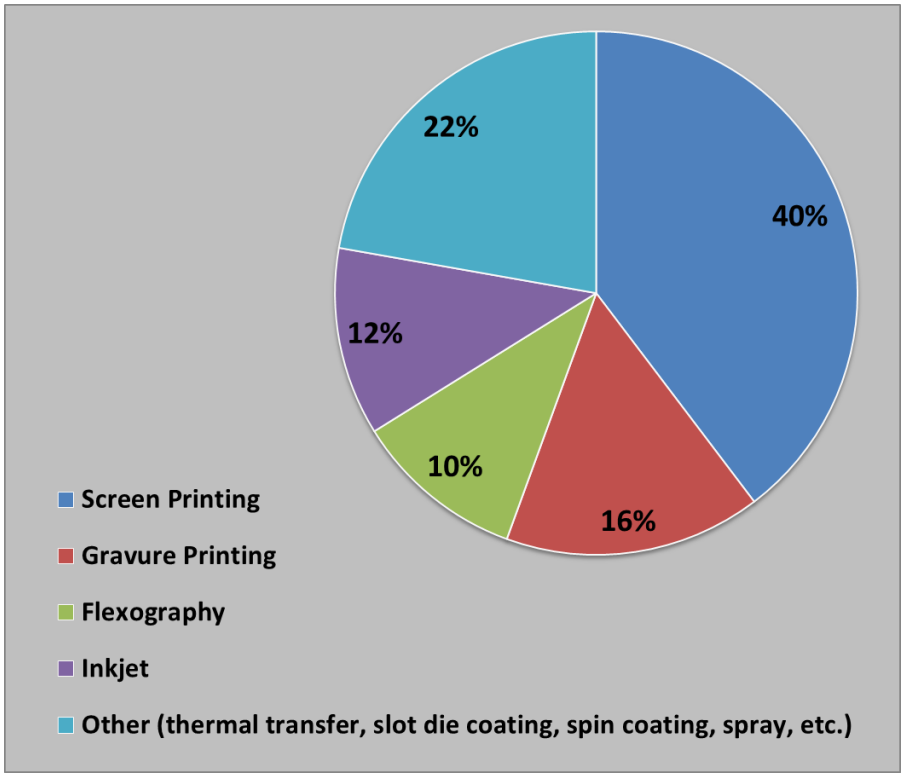
By Material Type





Current Status cont'd

By Deposition Method



DEMONSTRATION

Online Materials Registry

http://www.wmich.edu/engineer/cape/registry-video.php

Materials Registry – Main Page

GRANTA MI

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Center for the Advancement of Printed Electronics

Printed Electronic Materials Database

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- Barrier Coatings & Encapsulants

Deposition Techniques

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Materials Registry Demo cont'd

- Browsing by Application

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    - Organic
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    - Subset: No Subset
    - 01. Gravure Printing

View | Tools | Units

11. Electroluminescence

Application Information

Application	Electroluminescence

Materials

Dielectric Materials (Electroluminescence)	2 Linked Record(s) Dielctric TTR DuPont 5018 UV Curable Dielectric
Conductive Materials (Electroluminescence)	17 Linked Record(s) Show All
Barrier Coatings & Encapsulants (Electroluminescence)	1 Linked Record(s) DuPont 5018 UV Curable Dielectric
Substrate Materials (Electroluminescence)	7 Linked Record(s) Acrylic Film CAB film Polyimide Films Polyimide Substrates Polysulfone Films PVC film Ultem Polyetherimide Films

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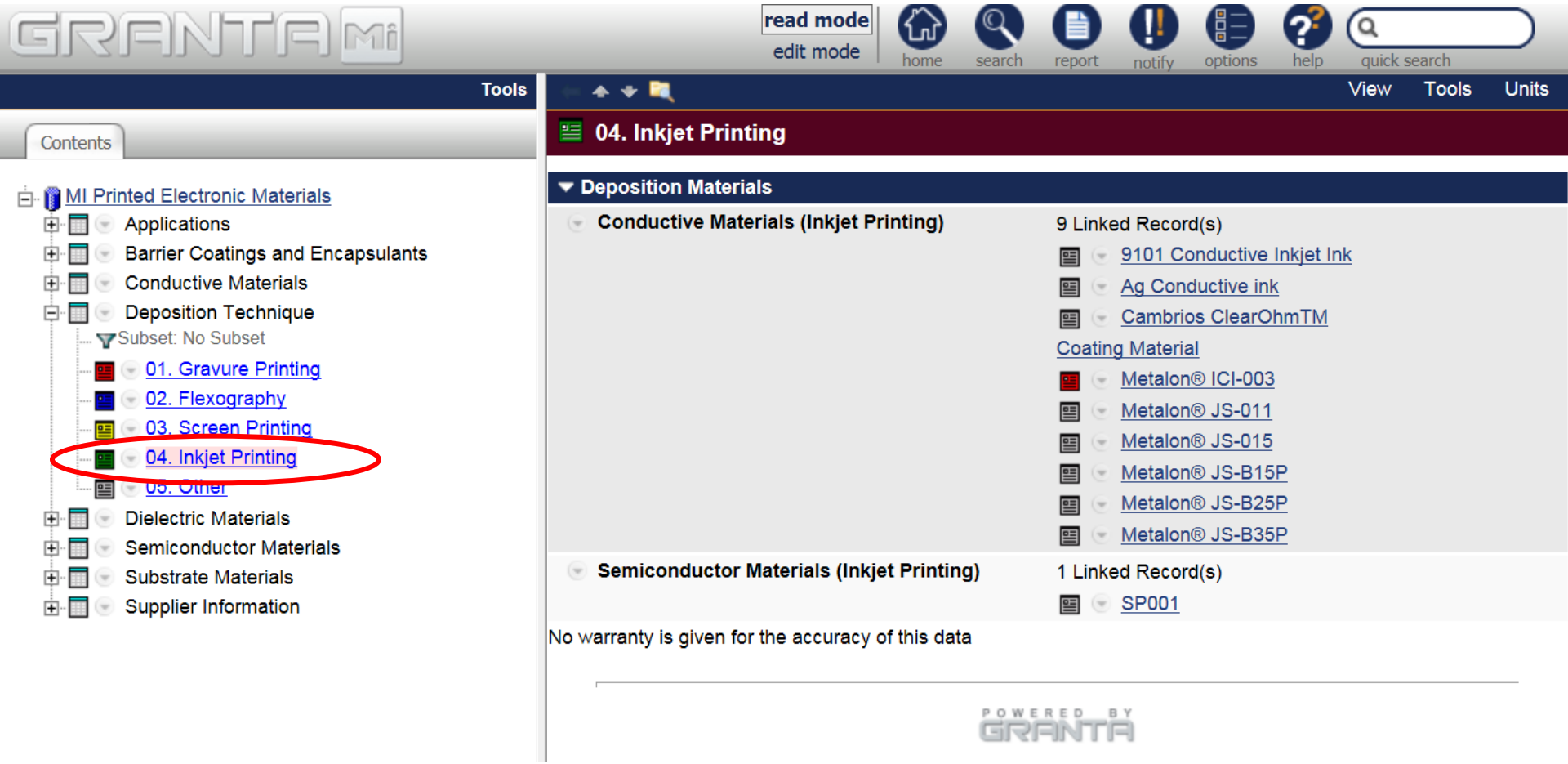
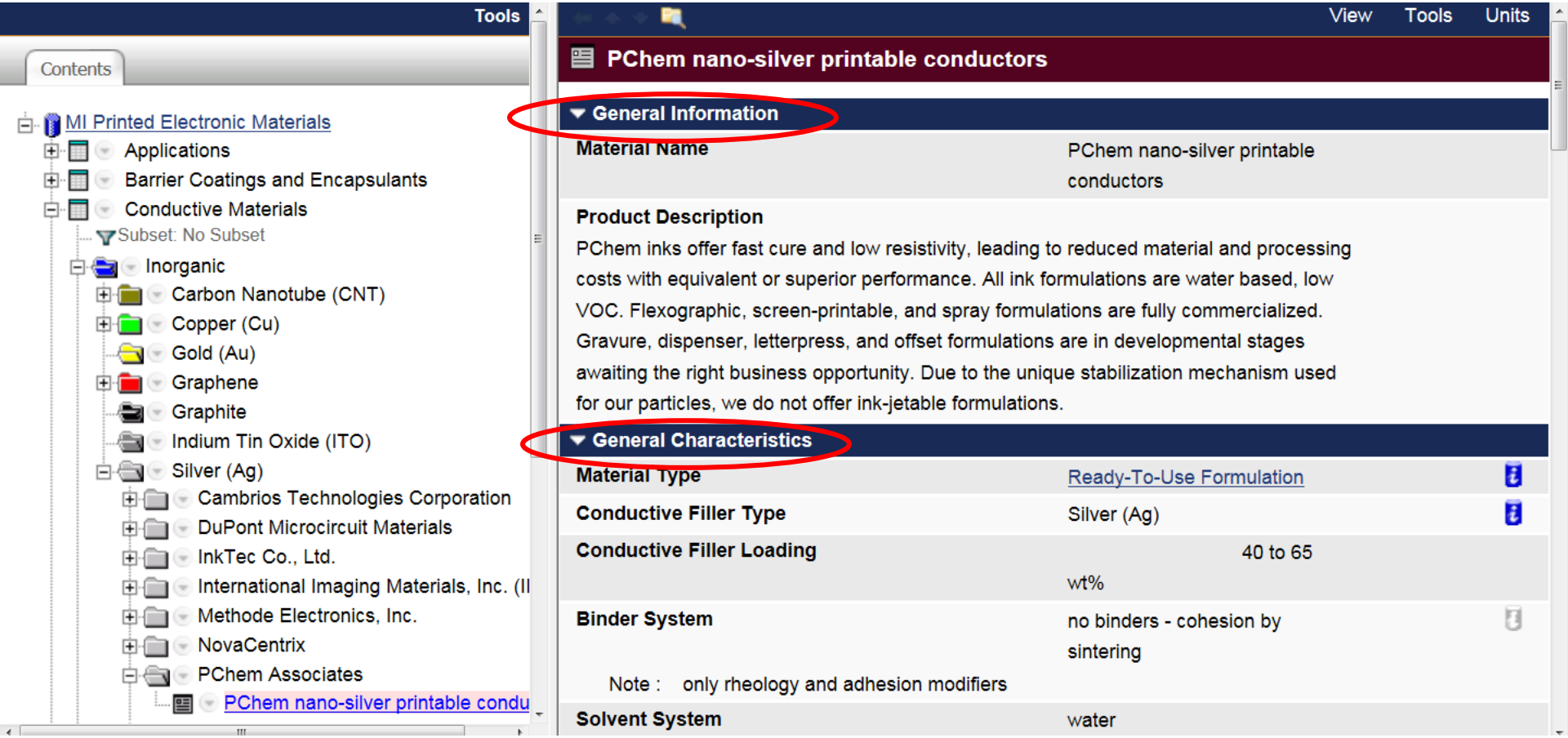
Materials Registry Demo cont'd

- Browsing by Deposition Technique



Materials Registry Demo cont'd

- Example of a Material Record



Materials Registry Demo cont'd

- Example of a Material Record cont'd

Wet Properties

Viscosity	100 to 50000 cP	
Note : formulation and shear dependant		
Density	1.5 to 2.5 lb/ft^3	
Note : formulation dependant		
Surface Tension	Not Applicable	
Note : wets most substrates		

Deposition

Gravure Deposition	No
Note : Developmental	
Flexo Deposition	
Flexography Records	
Screen Deposition	
Screen Printing Records	
Inkjet Deposition	

Dry Layer Properties

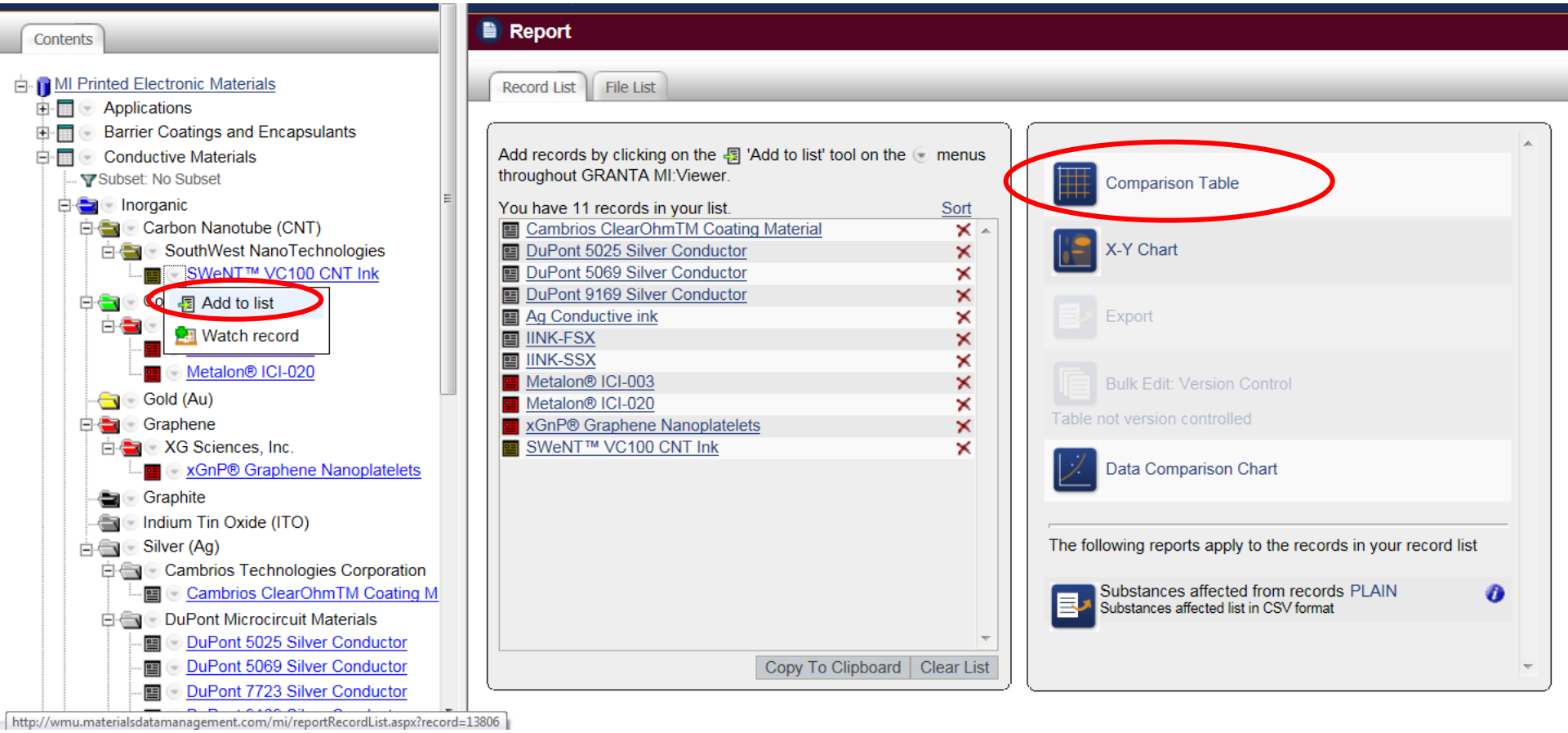
Electrical Volume Resistivity	0.000005 to 0.00002	ohm.cm
Electrical Sheet Resistivity	0.02 to 0.4	ohm/sq
Thickness	0.1 to 2	µm
Transmission/Transparency	0 to 95	%
Adhesion	5/5	
Recommended Substrates		
Melinex 454, ST505, coated paper, others		

Suggested Applications

Photovoltaics	Yes
Photovoltaics Records	1 Linked Record(s)

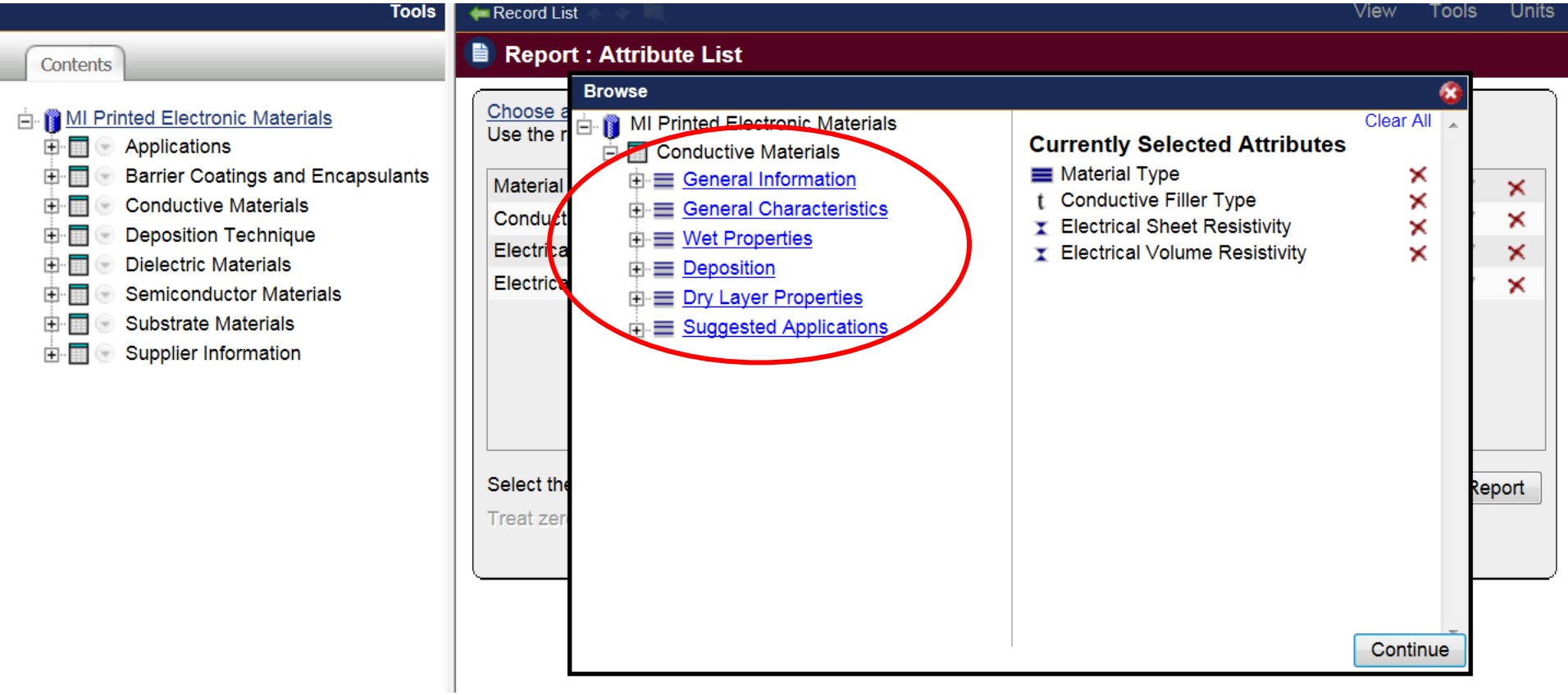
Materials Registry Demo cont'd

- Comparison of Materials



Materials Registry Demo cont'd

- Comparison of Materials cont'd



Materials Registry Demo cont'd

- Comparison of Materials cont'd

Report

	Material Type	Conductive Filler Type	Viscosity (cP)	Curing Temperature (°C)	Electrical Sheet Resistivity (ohm/sq)
Cambrios ClearOhmTM Coating Material	Ready-To-Use Formulation	Silver (Ag)	1 to 100	80 to 140	10 to 500
DuPont 5025 Silver Conductor	Ready-To-Use Formulation	Silver (Ag)	20000 to 30000	110 to 170	0.012 to 0.015
DuPont 9169 Silver Conductor	Ready-To-Use Formulation	Silver (Ag)	40000 to 70000	120 to 170	0.012 to 0.018
IINK-FSX	Ready-To-Use Formulation	Silver (Ag)	15 to 20	40 to 70	0.01 to 0.04
Metalon® ICI-003	Ready-To-Use Formulation	Copper	1 to 5	N/A	> 0.14
Metalon® ICI-020	Ready-To-Use Formulation	Copper	0 to 300000	N/A	> 0.04
xGnP® Graphene Nanoplatelets	Powder	Graphene	N/A		
SS 24600	Dispersion	Graphite	3500		0.1 to 40
SWeNT™ VC100 CNT Ink	Ready-To-Use Formulation	Carbon Nanotube (CNT)	50 to 5000		200 to 10000
Cu-iJ70P	Ready-To-Use Formulation	Copper (Cu)	30000 to 40000		
Clevios™ F E	Ready-To-Use Formulation	Organic	10 to 30	120 to 130	110

Save To Excel (CSV) | Copy To Clipboard | Transpose Table

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Demonstration Video

- Visit FlexTech website
- Check CAPE's website at:

http://www.wmich.edu/engineer/cape/registry.php

How Can Your Company Participate in Materials Registry?

- Population of the database is still in progress but now being handled by Abbie Gregg, Inc (AGI).

1. Send an email to jleslie@abbiegregg.com
2. You will receive excel importers and instructions on how to complete the forms
3. Submit the forms

Acknowledgments:
FlexTech Alliance for financial and technical support; **Granta Design Limited** for technical support and **Material Suppliers** for providing data

- Applied Nanotech, Inc.
- Cambrios Technologies Corporation
- DuPont Microcircuit Materials
- Dupont Teijin Films
- EMD Chemicals, Inc.
- Evonik Industries
- Felix Schoeller Holding GmbH & Co. KG
- Gwent Electronic Materials Ltd
- Henkel
- Heraeus Materials Technology LLC Conductive Polymers Division
- InkTec Co., Ltd.
- International Imaging Materials, Inc. (IIMAK)
- Intrinsiq Materials Ltd
- Methode Electronics, Inc.
- NanoIntegris Inc
- NanoMas Technologies, Inc.
- Neenah Technical Products
- NovaCentrix
- PChem Associates
- Polyera Corporation
- Polyonics, Inc
- Seashell Technology
- SouthWest NanoTechnologies
- Taiyo
- VCF Films, Inc.
- XG Sciences, Inc.

THANK YOU!

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