

Opportunities and Challenges for Flexible Electronics in the United States

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National Academies Workshop
2011 Flexible Electronics and Displays Conference

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Agenda

- Policy initiatives
- Innovation and Materials Science Institute
- Applications
- Technologies in Development

Policy Initiatives

Funding proposal to support development of flexible electronic technologies through the retooling of established capabilities in adjacent technologies

Adopt the methodology of the DOE Solid State Lighting program – phased development of enabling technologies and subsequent commercialization timelines

Intellectual property – current status hinders large company participation as entanglements prevent desirable freedom to operate transactions



The screenshot shows the homepage of the Solar Energy Technologies Program. The main navigation bar includes links for Home, About, Program Development, Market, Financial, Resource Center, News, and Events. The current page is 'Photovoltaic Supply Chain and Cross-Cutting Technologies'. The content area discusses the PV Supply Chain and Cross-Cutting Technologies project, which aims to develop and demonstrate technologies for the photovoltaic industry. It highlights the project's goals, partners, and funding.



The screenshot shows the homepage of the Solid-State Lighting program. The main navigation bar includes links for Home, About, Program Development, Market, Financial, Resource Center, News, and Events. The current page is 'Market-Based Programs'. It features a section on 'Standards Development for Solid-State Lighting', which aims to accelerate the development and implementation of needed standards for solid-state lighting products. It includes a list of standards, a glossary, and a contact form. Logos for various industry partners like ANSI, Illuminating Engineering Society, and IEC are displayed.

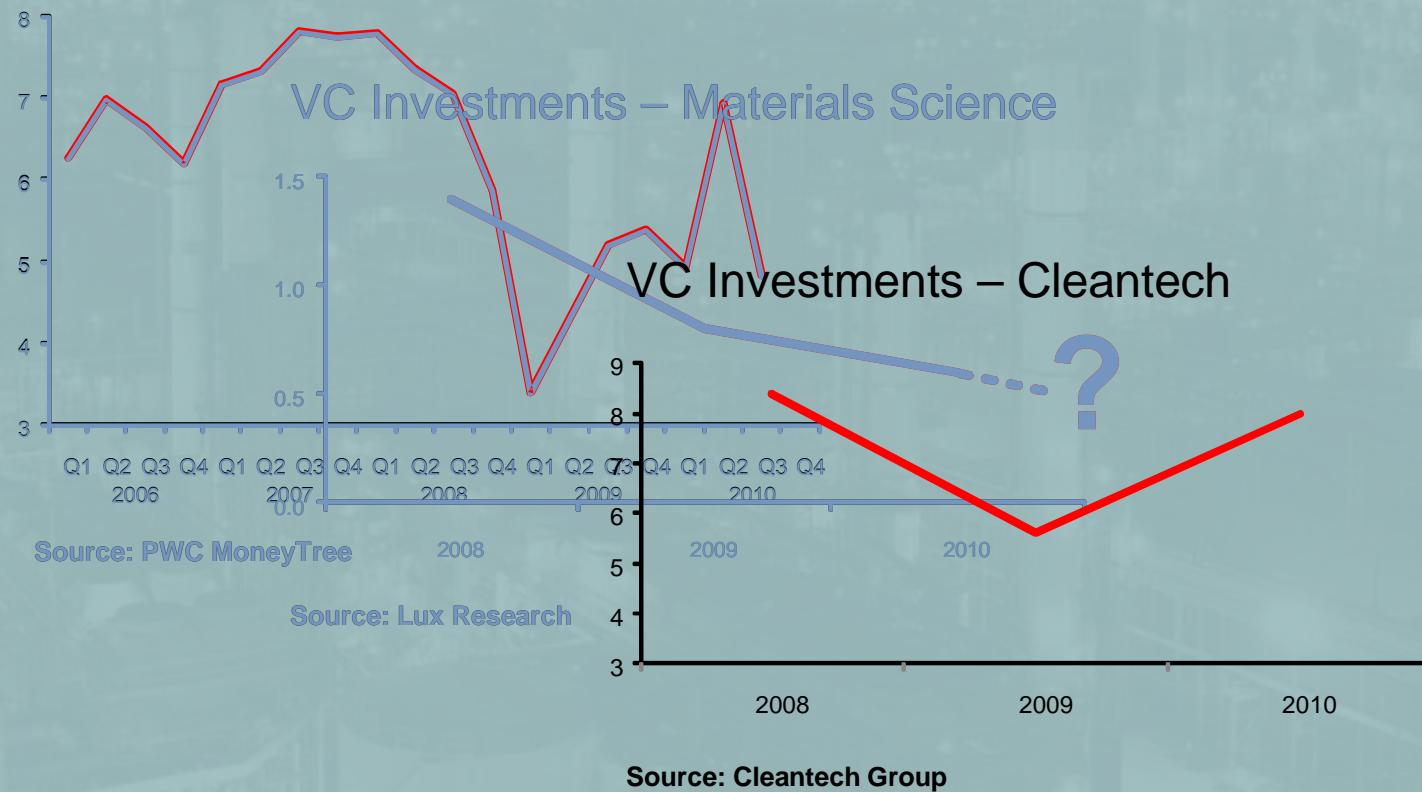


The screenshot shows the homepage of the United States Patent and Trademark Office (USPTO). The top navigation bar includes links for Home, Search, and Help. The main content area features a section on 'NMTI Deadline March 31', which discusses the National Medal of Technology and Innovation (NMTI) award. It includes a photo of the medal and a brief description of the award. The USPTO logo is prominently displayed at the top left.

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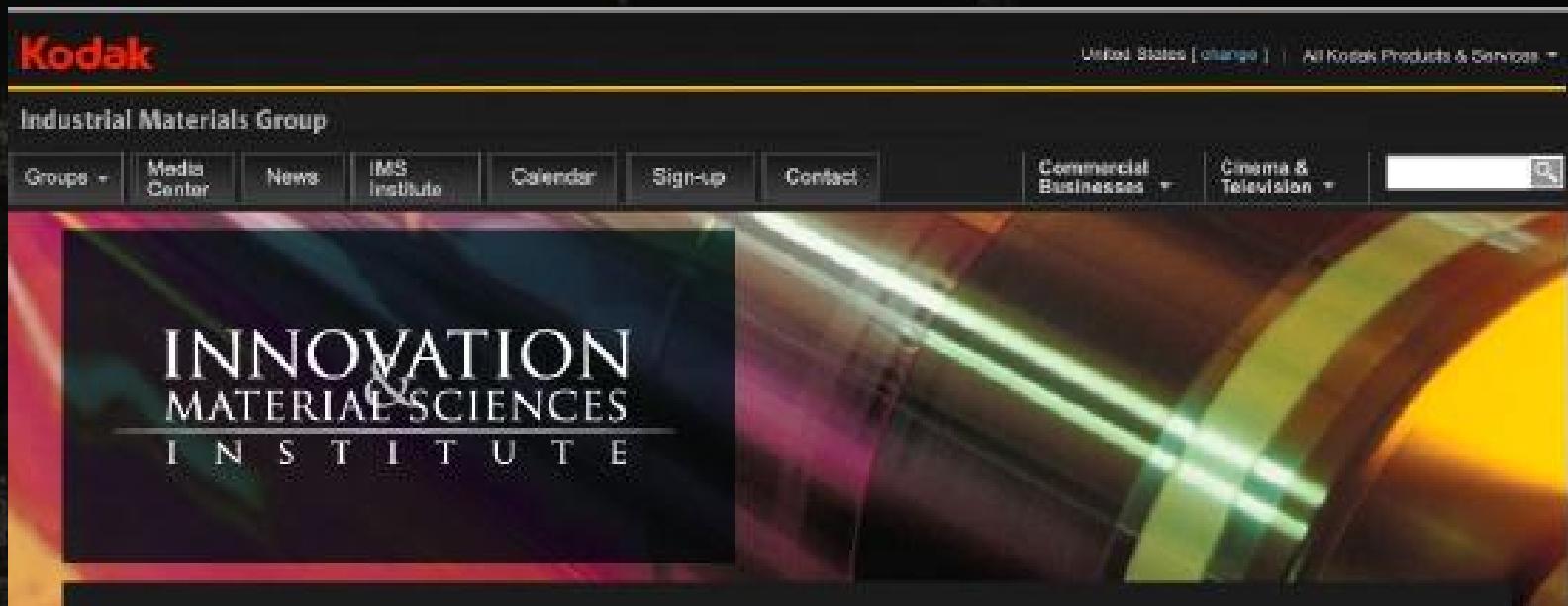
Venture Funding Trends

Venture Capital Investments



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Innovation and Material Sciences Institute (IMSI)



Demonstrated technical success in material science

Confirmed a solution for a target market

Credible business plan

Constructed a world class team

Introduction to funding partners and resources

Explore possible partnerships with sponsors

Broad support for commercialization needs

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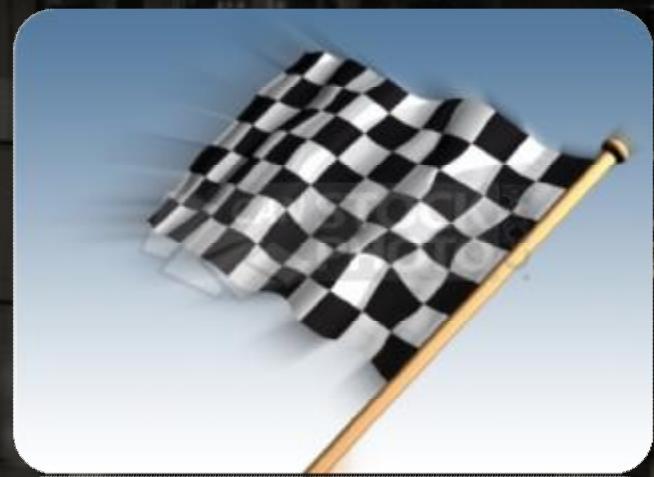
The IMSI Initiative

For established firms

- Asset utilization
- Leverage human expertise
- Joint development opportunities

For start-ups

- Preservation of capital assets
- Less risky & less expensive go-to-market
- Joint development opportunities



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Applications



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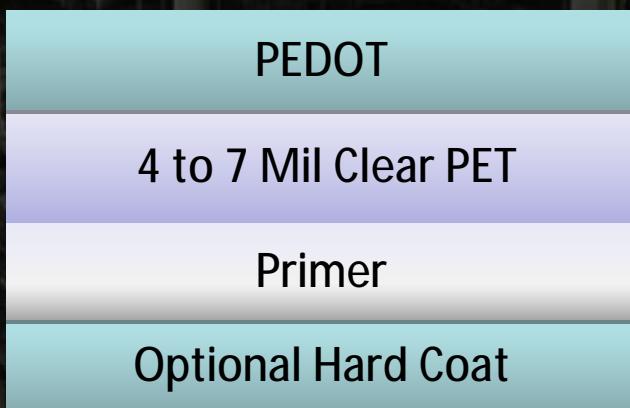
Technologies in Development

- Transparent conductive films
 - Available today at commercial scale
- Functional features
 - Probing market needs
- Patternable conductive materials and components
 - Touch, photovoltaic, and packaging
- Future technologies
 - Demonstrated fully printable thin-film transistors

Transparent Conductive Films

An alternative to ITO that is

- Conductive
- Transparent
- Flexible
- Durable
- Patternable



Commercially available as
KODAK HCF-350 Film / ESTAR Base



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Kodak Flexcel NX technology

Flexo advantages in Printable Electronics

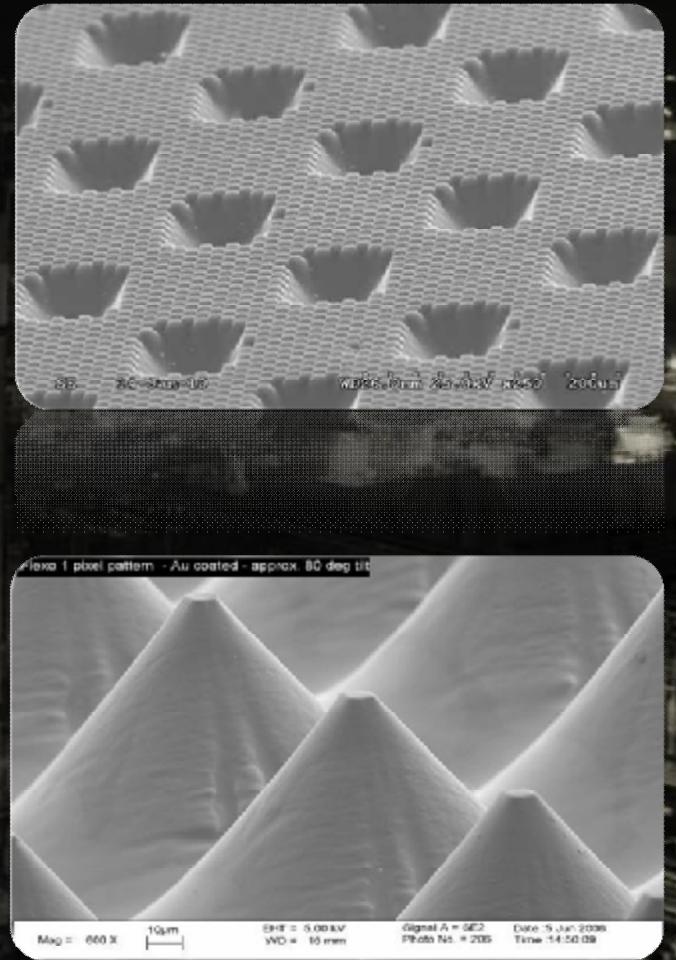
- Roll-to-roll, flexible substrate process
- Good ink and substrate latitude
- Can deposit small volumes
- Commercially proven process

Kodak Flexcel NX technology enables

- Fine features down to repeatable 10 µm on plate
- Better ink transfer due to surface micro-texturization (KODAK DigiCap NX screening)

Ideal technology for Printable Electronics

- Fine conductive lines and grids
- Uniform solids with fewer voids



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Spatial-Atomic Layer Deposition

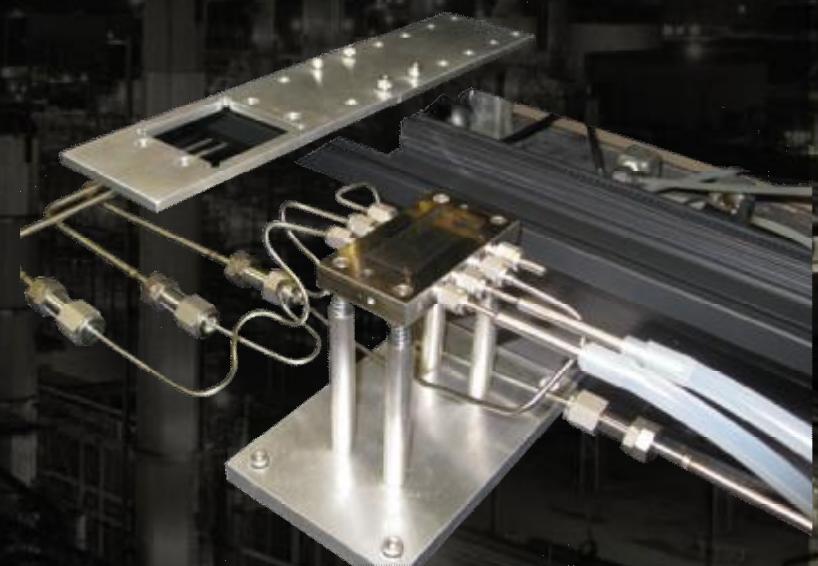
Deposition and patterning technology for:

Transparent conductors

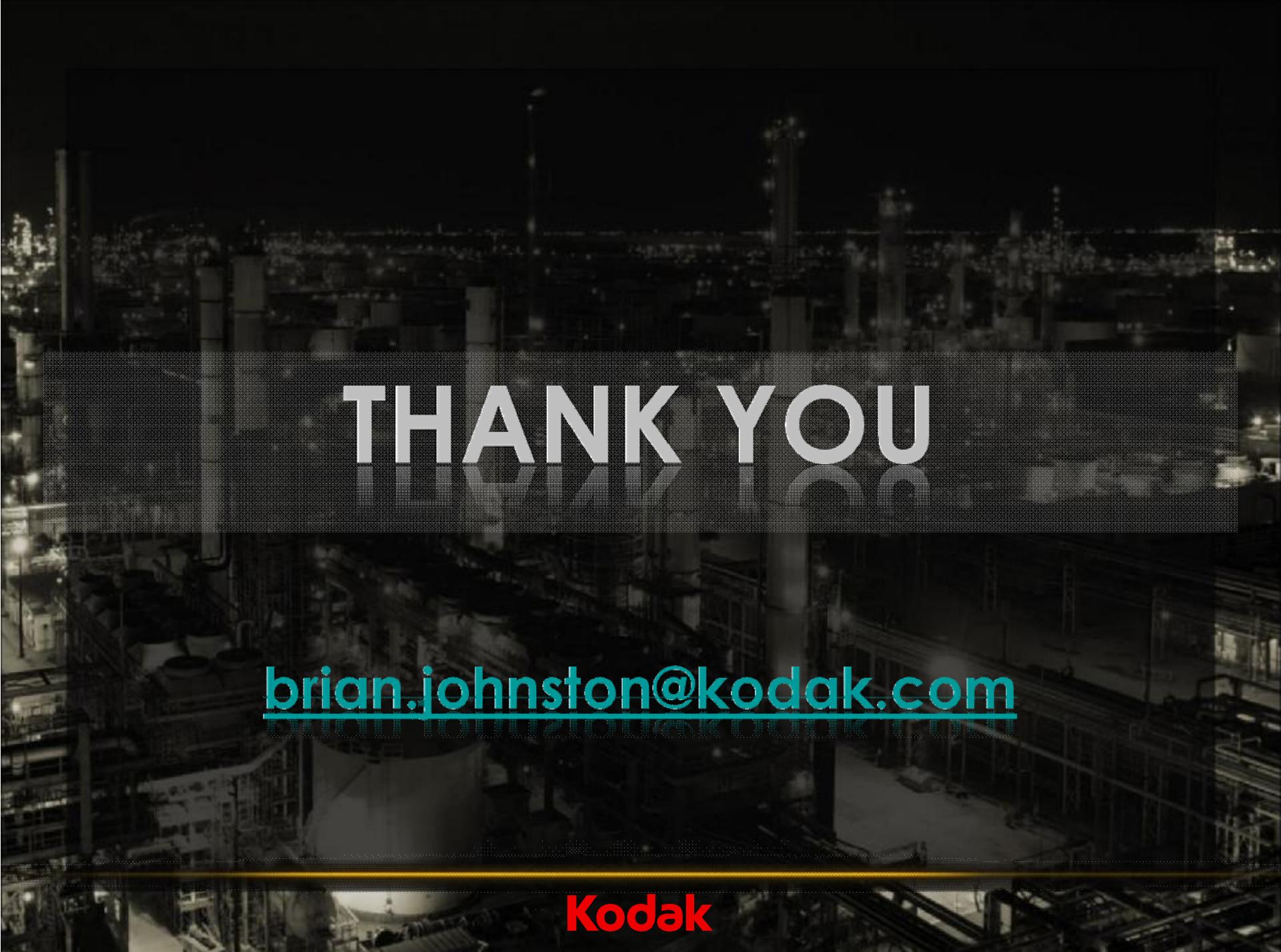
Thin-film transistors

Barrier layers

Roll-to-roll manufacturing



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THANK YOU

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