

# Jerzy Kanicki

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## Education

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### Universite Libre de Bruxelles, Bruxelles, Belgium

*(Free University of Brussels, Brussels, Belgium)*

- 1982      **Docteur en Sciences** (*Doctor es Science, D.Sc.*), Sciences  
D.Sc. Thesis Title: “*Optical Electrical and Photo-electronic Properties of trans-Poly-acetylene.*” Graduated with “Highest Distinction” (“La Plus Grande Distinction”)
- 1978      **Master of Science** (*M.Sc.*), Chemistry  
M.Sc. Thesis Title: “*Photo-electronic Properties of the SnO<sub>2</sub>-(poly-2-Vinlpyridine-I<sub>2</sub>) structures.*” Graduated with “High Distinction” (“Grand Distinction”)
- 1976      **Bachelor of Science** (*B.Sc.*), Chemistry

## Employment History

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- 1994-present      **University of Michigan, Ann Arbor, MI**  
*Position:* Professor of EECS  
*Research Interest:* Organic and molecular electronics; amorphous and polycrystalline semiconductors (inorganic and organic) thin-film devices and circuits; flat panel displays and sensors technology.
- 2000-present      **University of Michigan, Ann Arbor, MI**  
*Position:* Professor of Macromolecular Science and Engineering  
*Research Interest:* Organic materials, devices, and electronics
- 2003-2002      **University of California, Santa Barbara, CA**  
*Position:* Visiting Professor (Center for Polymers and Organic Solids)  
*Research Interest:* Organic polymers and devices; and electrically injected lasers

- 1994-1983      **IBM Thomas J. Watson Research Center, Yorktown Heights, NY**  
*Position:* Research Staff Member  
*Duties:* Member of the team that developed hydrogenated amorphous silicon (a-Si:H) thin film transistors (TFTs) and active-matrix arrays technology for active-matrix (AM) liquid crystal displays (LCDs). This development resulted in introduction by IBM of the first color laptop computer (CL57-SX) on March 24, 1992.
- 1983-1982      **Belgium Army, Belgium**  
*Position:* Sergeant Major in Belgium Army  
*Duties:* Responsible for a unit of about 30 soldiers, and training of new soldiers.

## **Consulting**

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Past consulting has been in fields of study generally related to:

- Hydrogenated amorphous silicon (s-Si:H) thin-film transistors (TFT) technology
- Active-matrix liquid-crystal displays (AM-LCDs) technology
- A-Si:H TFT processing, properties and electrical characterization methods
- Thin-film plasma-enhanced chemical vapor deposition (PECVD) technology
- AM-LCD pixel electrodes circuits and related driving schemes
- Electrical instability of the a-Si:H TFTs
- Device physics of the a-Si:H TFTs
- Electrostatic discharge protection (ESD) circuits for AM-LCDs
- Next generation flat panel display technologies

Has also expertise in the following topics:

- Patent infringements
- Expert witness and testimony
- Litigation support consultant

Able to provide patents background research and testimonials in support of the attorneys and their clients during patents infringement litigations. Past projects have been with a number of multinational organizations both large and medium size.

## **Honors and Awards**

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- 1999 Recognized by **Materials Research Society (MRS)** for serving as a tutorial instructor during Spring Meeting
- 1992 & 1996 Recognized by **Materials Research Society** for contributions in serving the society as symposia organizer
- 1989, 1990 & 1993 **IBM External Honors** for technical leadership
- 1982 **Stas Prize** for outstanding Sc.D. thesis research work

## Teaching

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- EECS 215 – Introduction to Circuits
- EECS 314 – Electrical Circuits, Systems and Applications
- EECS 421 – Properties of Transition
- EECS 512 – Amorphous and Microcrystalline Thin Film Devices
- EECS 513 – Flat Panel Displays
- EECS 498 & 598 – Organic and Molecular Electronics

## Professional Service and Associations

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- Officer: Director for Metropolitan Detroit, Society for Information Displays
- Editor:
- IEEE Transaction on Electron Devices, 1989, 2005-present
  - Journal of Non - Crystalline Solids, 1995
  - Materials Research Society Proceedings, 1993, 1995, 1996 and 1997
  - Book on “*Amorphous & Microcrystalline Semiconductor Devices*,” Artech House, Inc., two volumes, 1991 and 1992
  - Journal of Korean Display Society, foreign member
- Organizer:
- International Topical Conference on “*Hydrogenated Amorphous Silicon Devices and Technology*,” November 21-23, 1988, Yorktown Heights, NY
  - Symposium on “*Amorphous Insulating Thin Films*,” 1992 Materials Research Society Fall Meeting, December 1-4, 1992, Boston, MA
  - Symposium on “*Amorphous Insulating Thin Films II*,” 1994 European Materials Research Society Spring Conference, May 24-27, 1994, Strasbourg, France

- Symposium on “*Amorphous and Crystalline Insulating Thin Films III*,” 1995 International Conference on Solid State Devices and Materials, August 21-24, 1995, Osaka, Japan
- Symposium on “*Flat Panel Displays Materials II*,” 1996 Materials Research Society Spring Meeting, April 8-12, 1996, San Francisco, CA

Committee:

- Society for Information Display (SID Meetings – program )
- Materials Research Society (MRS Meetings – program committee member)
- The Japan Society of Applied Physics (AM-FPDs Workshops – program committee member)
- IEEE – The Election Devices Society (IEDM and DRC – program committee member; IEEE “*Standard Test Methods for the Characterization of Organic Transistors*”- standard development committee member; and “*Organic Electronics*” - technical committee member)

Referee:

IEEE Trans. Elec. Dev., IEEE Elec. Dev. Letters, Appl. Phys. Letters, J. Appl. Phys., Thin Solid Films, etc.

Panelist:

(Proposal review) National Science Foundation and DoD; panelist at various national and international meetings.

Member:

IEEE (Senior Member), SID, APS, MRS, ACS, SPIE

### **University (of Michigan) Service**

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- Freshman advisor, College of Engineering
- Casebook committee – chair
- College representative
- ECE faculty search committee - member
- Senate Assembly and SACU - alternate
- Electrical engineering graduate program committee - member
- Undergraduate student projects laboratory coordinator

### **Research Record**

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1995-present **University of Michigan, Ann Arbor, MI**

- Developed fundamental understanding and active-matrix array technologies (high-deposition rate PECVD processes for a-Si:H TFT, high field-effect mobility a-Si:H TFT, Al and Cu metallurgy, pixel electrode planarization, new multi-domain pixel electrode structure and buried bus-line structure) for large area, high-aperture-ratio, wide-viewing angle and high-resolution AM-LCDs. The high deposition-rate PECVD processes and high field-effect mobility a-Si:H TFT and planarization technologies have been adopted by several AM-LCDs companies in their production.
- Developed and fabricated a new high-voltage a-Si:H TFT structure for reflective cholesteric liquid-crystal displays. The engineering reflective display prototype was built for DARPA in collaboration with the Kent State University and Kent Displays Inc.
- Provided TFT fundamental understanding leading to development of the high-performance top-gate a-Si:H TFTs for reflective and transmissive AM-LCDs. This technology was transferred to flat panel industry.
- Developed an accurate method, based on A.C. bias-temperature-stress of the a-Si:H TFT and modeling, for predicting the AM-CLD lifetime. Several flat panel display companies have adopted this method to evaluate lifetime of their AM-LCDs.
- Developed a practical method to collect vibrational absorption spectra, free of interference fringes and free of absorption deviation induced by interfacial reflection, for amorphous and organic thin-films
- Introduced a new lightly doped drain (LDD) poly-Si TFT structure, with symmetrical electrical characteristics independent of the TFT process induced misalignment.
- Developed fundamental understanding and technology of the multi-color organic polymer light-emitting devices (PLEDs) (including white light emitting PLEDs) leading to fabrication of the device with a high-efficiency on both glass and plastic substrates. This technology was used to fabricate high-resolution (100 and 200 dpi) voltage- and current-driven active-matrix organic light-emitting displays (AM-OLEDs) on glass that can be used for medical imaging.
- Invented and fabricated new a-Si:H TFTs structures and pixel electrode circuits with improved electrical properties and stability for active-matrix organic light emitting displays (AM-OLEDs).

- Developed science and technology for organic thin-film transistors based on solution-processed polycrystalline metallo-porphyrins (in collaboration with Prof. N. Ono, Ehime University, Japan) and poly-fluorenes (in collaboration with Dow Chemical). The novelty in metallo-porphyrins is control of their structural and electronic properties.

1995-1983 **IBM T.J. Watson Research Center, Yorktown Heights, NY**

- Formulated engineering specifications of large-area plasma-enhanced chemical vapor deposition (PECVD) used in manufacturing of the active-matrix liquid crystal displays (AM-LCDs).
- Implemented large-area PECVD processes for deposition of amorphous silicon (a-Si:H), N-rich amorphous silicon nitride (a-SiN<sub>x</sub>:H), P-doped a-Si:H, and undoped and n-type doped microcrystalline silicon thin films, which have been used in the fabrication of the AM-LCDs.
- Developed fabrication know-how of the amorphous and polycrystalline silicon thin-film transistors used in AM-LCDs.
- Provided fundamental understanding of the materials properties, device characterization methods, and technologies for AM-LCDs.
- Developed expertise to fabricate and characterize amorphous, microcrystalline and polycrystalline semiconductor devices (including the semiconductor / insulator interface properties).
- Provided characterization expertise of the physical, chemical, optical and electrical properties for amorphous, microcrystalline and polycrystalline semiconductors, and insulators thin films.
- Formulated the fundamental understanding of deep-gap trapping centers in a-SiN<sub>x</sub>:H thin films leading to discovery of the so called K- and N- centers in a-SiN<sub>x</sub>:H. This discovery was made jointly with the Penn State University (Prof. P. Lenahan)

1978-1982 **Free University of Brussels, Brussels, Belgium**

- Supervised several master degree students and visitors research work in the area of organic polymer thin-film devices.
- Developed fundamental understanding and know-how of the methods used in fabrication and characterization of different organic polymer thin- films devices.

- Established characterization techniques of the optical, electrical and photovoltaic properties of the organic polymer thin-film solar cells.

### **Areas of Expertise**

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- Hydrogenated amorphous and polycrystalline silicon and alloys, devices and circuits
- Flat panel displays (transmissive reflective and emissive) technology
- Organic semiconductors, devices and circuits
- Metal oxide semiconductors and devices

### **Publications**

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1983 - present            Over 250 publications, 5 book chapters, and one book on “High-Fidelity Medical Imaging Displays.” (List enclosed.)

### **Presentations at Professional Meetings**

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1985-present            Over 70 invited and 250 contributed presentations at the national and international meetings. (List enclosed.)

### **Interests and Others**

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- Love sports
- Enjoy working with others
- Fluent in French and Polish; and limited knowledge of Italian and Russian
- Married, three children (19, 16, 11)