CURRICULUM VITAE

Name: Ta-Ya Chu
Nationality: Taiwan **Residence**: Permanent Residence of Canada
Address: 1768 Windflower Way, Ottawa, ON, K1C 5Y9, Canada
E-mail: ta-ya.chu@nrc-cnrc.gc.ca
Phone : 1-613-949-7558(Office)

Dr. Chu has been working as a Research Officer at National Research Council Canada since 2008. He has more than fifteen years experiences in the field of organic electronics, such as OLED, OPV, OTFT and printable electronics. He has contributed more than thirty publications which have been cited more than 1200 times (h index=15).

Dr. Chu invented the first inverted bottom-emission OLED and rewarded as the most valuable researches by Chunghwa Picture Ltd. in 2005 and 2006. Because of his achievements in R&D of OLEDs, Samsung SDI invited him to join R&D group for the OLED mass production in south Korea when he received his PhD from the National Chiao Tung University in Taiwan in 2006. After a few years experiences in OLEDs, he decided to join National Research Council Canada to extend his research field from the small molecular based OLEDs to the polymer based solution processable of organic electronics since 2008.

After 3 years R&D at NRC, he broken the world record efficiency in organic photovoltaics (OPV) and received the “Outstanding Research Achievement Award” by NRC-IMS in 2011. One of the OPV cell he made in the lab has been demonstrating at the Canada Science and Technology Museum in Ottawa since 2011. The world’s largest photovoltaic’s conference, EU PVSEC, also invited him to serve as a member of the International Scientific Committee from 2011 to 2014.

He has been focusing on the research and development of printable electronics since 2012. Using the different printing technologies to produce the printable electronics, e.g. use the inkjet printing technology to produce a functional circuits with the printed organic transistors on flexible substrates, such as plastic or paper. This emerging technology will bring a significant changes in the world.

Employment

- 09/2012 - Present **Associate Research Officer**, Information and Communications Technologies Portfolio, National Research Council Canada (**NRC**)
- 04/2012- 08/2012 **Assistant Research Officer**, Information and Communications Technologies Portfolio, National Research Council Canada (**NRC**)
- 09/2008- 03/2012 **Assistant Research Officer**, Institute for Microstructural Sciences, National Research Council Canada (**NRC**)
- 12/2006- 08/2008 **Senior Engineer**, OLED R&D, **Samsung SDI**, Korea
- 05/2002- 05/2003 **Engineer**, Windell (Wintek Corp.), Taiwan
- 10/1999- 5/2002 **Research Assistant**, Institute of Chemistry, **Academia Sinica**, Taiwan

- **Education**
- Ph.D. 2006, Institute of Electrophysics, National Chiao Tung University, Taiwan
- M.S. 1999, Institute of Physics, Tamkang University, Taiwan
- B.S. 1997, Department of Physics, Chinese Culture University, Taiwan

Research Interests and Experiences

- Printable electronics, such as solution processable organic photovoltaics (OPV), organic transistors (OTFT), organic photo-sensors (OPS) etc.
- Organic light-emitting devices (OLEDs) for display and lighting applications
- Organic materials design and modeling—Based on the first-principle computational simulation

Professional Activities/Honors/Awards

- **2011 NRC-IMS Outstanding Research Achievement Award**
- **Invited Reviewer** for *AIP Advances*, *Applied Physics Letters*, *Journal of Applied Physics*, *IEEE photonics Technology Letters*, *Energy & Environmental Science*, *Journal of The Electrochemical Society*, *Solid State Communications*, *Synthetic Metals* and *Journal of Physics and Chemistry of Solids*
- **Invited International Scientific Committee member** for the European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC) 2011 to 2014.
- **Chairperson for the Conference Session**: EU PVSEC (2010, 2011), EITC (2012)
- **Scholarship rewarded** as the most valuable researches by Chunghwa Picture Tubes, Ltd

Skills Description:

- Strong background in semiconductor physics, molecular chemistry and material modeling
- Over 10 years experience/knowledge of fabrication, design and characterization of highly efficient organic electronic devices
- Design innovative materials and develop in-depth knowledge of organic electronic material properties and applications for OLED and OPV technologies.
- Experience/knowledge of carrier transporting properties in organic thin film (carrier mobility evaluated by using transient EL, time-of-flight, SCLC and dark-injected transient)
- Electronic structure of materials investigated by Density Functional Theory simulation
- Knowledge of modern analytical techniques (AFM, FTIR, SEM, XRD, TEM, UV-Visible, photoluminescence,4-point probe)

Patents

- US2008/0042556A1, CN101132053, **Ta-Ya Chu**, Szu-Yi Chen, Chin-Hsin Chen, Wen-Jian Shen, Shuenn-Jiun Tang, Chan-Ching Chang, “Organic light emitting structure”

- US2007/0048547A1, TW I257946, Chang, Chan-Ching; Chen, Chin-Hsin; Huang, Hsiao-Wen; **Chu, Ta-Ya**; Liao, Chi-Hung; Lo, Shih-Kuei; Tang, Shuenn-Jiun "Organic electro-luminescent device and material of hole-transport layer"
- US2007/0046179A1, TW I252058, Chang, Chan-Ching; Huang, Hsiao-Wen; Chen, Chin-Hsin; **Chu, Ta-Ya**; Liao, Chi-Hung; Lo, Shih-Kuei; Tang, Shuenn-Jiun " Organic electro-luminescent device"
- US2005/0029092A1, TW00579612, **Chu, Ta-Ya**; Lin, Gwo-Sen; "Apparatus and method of employing self-assembled molecules to function as an electron injection layer of OLED"

Peer-Reviewed Publications

1. **Ta-Ya Chu**, Jianping Lu, Serge Beaupré, Yanguang Zhang, Jean-Rémi Pouliot, Jiayun Zhou, Ahmed Najari, Mario Leclerc, and Ye Tao, "Effects of the Molecular Weight and the Side Chain Lengths on the Photovoltaic Performance of the Dithienosilole/Thienopyrrolodione Copolymers", ***Adv. Func. Mater.*** 22, 2345-2351 (2012) (IF=10.179)
2. **Ta-Ya Chu**, Sai-Wing Tsang, Jiayun Zhou, Pierre G. Verly, Jianping Lu, Serge Beaupré, Mario Leclerc, Ye Tao, "High-efficiency inverted solar cells based on a low bandgap polymer with excellent air stability. ***Sol. Energy Mater. Sol. Cells*** 96, 155-159 (2012). (IF=4.542)
3. **Ta-Ya Chu**, Jianping Lu, Serge Beaupré, Yanguang Zhang, Jean-Rémi Pouliot, Salem Wakim, Jiayun Zhou, Mario Leclerc, Zhao Li, Jianfu Ding, and Ye Tao, "Bulk Heterojunction Solar Cells Using Thieno[3,4-c]pyrrole-4,6-dione and Dithieno[3,2-b:2',3'-d]silole Copolymer with a Power Conversion Efficiency of 7.3%", ***J. Am. Chem. Soc.*** *133* (12), pp 4250–4253 (2011) (IF=9.907)
4. **Ta-Ya Chu**, Salima Alem, Wai-Wing Tsang, Shing-Chi Tse, Salem Wakim, Jianping Lu, Gilles Dennler, David Waller, Russell Gaudiana, and ye Tao,"Morphology control in polycarbazole based bulk heterojunction solar cells and its impact on device performance, ***Appl. Phys. Lett.*** 98, 253301 (**2011**) (IF=3.844)
5. Salima Alem, Ta-Ya Chu, Shing C. Tse, Salem Wakim, Jianping Lu, Raluca Movileanu, Ye Tao, Francis Belanger, Denis Desilets, Serge Beaupre, Mario Leclerc, Sheila Rodman, David Waller, Russell Gaudiana, "Effect of mixed solvents on PCDTBT:PC70BM based solar cells, ***Organic Electronics*** 12, 1788 (2011) (IF=4.047)
6. **Ta-Ya Chu**, Salima Alem, Pierre Verly, Salem Wakim, Jianping Lu, Ye Tao, Serge Beaupré , M. Leclerc , Francis Bélanger , Denis Désilets , Sheila Rodman , David Waller , Russell Gaudiana, "Highly Efficient Polycarbazole-based Organic Photovoltaic Devices", ***Appl. Phys. Lett.*** 95, 063304 (2009) (IF=3.844) this article has been selected for the August 31, 2009 issue of ***Virtual Journal of Nanoscale Science & Technology***. (Top 20 most Downloaded APL articles in August 2009)
7. **Ta-Ya Chu**, Chung-Yin Kwong and Ok-Keun Song, "Enhanced performance of organic light-emitting diodes with an air-stable n-type hole injection layer", ***Appl. Phys. Lett.*** 92, 233307 (2008) (IF=3.844)

8. **Ta-Ya Chu**, Ok-Keun Song, "Apparent of thickness dependence of mobility in organic thin films analyzed by Gaussian disorder model", ***J. Appl. Phys***. 104, 023711 (2008) (IF=2.168)
9. **Ta-Ya Chu**, Yong-Han Lee, Ok-Keun Song, "Effects of interfacial stability between electron transporting layer and cathode on the degradation process of organic light-emitting diodes", ***Appl. Phys. Lett.*** 91, 223509 (2007) (IF=3.844)
10. **Ta-Ya Chu**, Ok-Keun Song, " Thickness dependence of the trap states in organic thin film of N,N'-bis(phenyl) benzidine", ***Appl. Phys. Lett.*** 91, 073508 (2007) (IF=3.844)
11. **Ta-Ya Chu**, Ok-Keun Song, "Hole mobility of N, N'-Bis(naphthalen-l-yl)-N,N'-bis(phenyl) benzidine (NPB) investigated by using space-charge-limited currents", ***Appl. Phys. Lett.*** 90, 203512 (2007) (IF=3.844)
12. **Ta-Ya Chu**, Szu-Yi Chen, Jenn-Fang Chen, Chin H. Chen "Comparative Study of Single and Multi-Emissive Layers in Inverted White Organic Light-Emitting Devices", ***Appl. Phys. Lett.*** 89, 113502 (2006) (IF=3.844)
13. **Ta-Ya Chu**, Szu-Yi Chen, Chao-Jung Chen, Jenn-Fang Chen, Chin H. Chen "Highly Efficient and Stable Inverted Bottom-Emission Organic Light Emitting Devices", ***Appl. Phys. Lett.*** 89, 053503 (2006) (IF=3.844)
14. **Ta-Ya Chu**, Szu-Yi Chen, Jenn-Fang Chen, Chin H. Chen "Ultra-Thin Electron Injection Layer on ITO Bottom Cathode for Highly Efficient Inverted OLED", ***Jpn. J. Appl. Phys.*** 45, 4948 (2006) (IF=1.168)
15. Szu-Yi Chen, **Ta-Ya Chu**, Chien-Ying Su, Jenn-Fang Chen, Chin H. Chen "Stable Inverted Bottom-Emitting Organic Electroluminescent Devices with Molecular-Doping and Morphology-Improvement", ***Appl. Phys. Lett.*** 89, 053518 (2006) (IF=3.844)
16. **Ta-Ya Chu**, Yao-Shan Wu, Jenn-Fang Chen, Chin H. Chen "Characterization of Electronic Structure of Aluminum(III) bis(2-methyl-8- quninolinato)-4-phenylphenolate (BAlq) Host Molecule for Phosphorescent Organic Light Emitting Devices" ***Chem. Phys. Lett.*** 404, 121 (2005) (IF=2.337)
17. **Ta-Ya Chu**, Meng-Huan Ho, Jenn-Fang Chen, Chin H. Chen "Ab initio Molecular Orbital Study of 1,3,5-Triazine Derivatives for Phosphorescent Organic Light Emitting Devices" ***Chem. Phys. Lett.*** 415, 137(2005) (IF=2.337)
18. Meng-Huan Ho, Chia-Ming Chang, **Ta-Ya Chu**, Teng-Ming Chen and Chin H. Chen, "Iminodibenzyl-substituted distyrylarylenes as dopants for blue and white organic light-emitting devices", ***Organic Electronics*** 9, 101 (2008) (IF=4.047)
19. Meng-Huan Ho, Banumathy Balaganesan, **Ta-Ya Chu**, Teng-Ming Chen and Chin H. Chen, "A morphologically stable host material for efficient phosphorescent green and red organic light emitting devices", ***Thin Solid Films*** 517, 943 (2008) (IF=1.890)
20. Young-Mo Koo, Sung-Jin Choi, **Ta-Ya Chu** and Ok-Keun Song, "Ohmic contact probed by dark injection space-charge-limited current measurements", ***J. Appl. Phys.*** 104, 123707 (2008) (IF=2.168)
21. Yu-Sheng Chang, Chih-Tao Chien, Chun-Wei Chen, **Ta-Ya Chu**, Hsuen-Han Chiang, Chen-Hao Ku, Jih-Jen Wu, Chao-Sung Lin, Li-Chyong Chen and Kuei-Hsien Chen, "Structural and optical

properties of single crystal Zn1-xMgxO nanorods—Experimental and theoretical studies", **J. Appl. Phys.** 101, 033502 (2007) (IF=2.168)

22. **Ta-Ya Chu,** Szu-Yi Chen, Chao-Jung Chen, Jenn-Fang Chen, Chin H. Chen, *Highly Efficient and Stable Inverted Bottom-Emittion Organic Light Emitting Devices*, (***Oral presentation***) SID International Symposium, Seminar, and Exhibition, (**SID'06**) Digest paper p29.2 San Francisco, USA, June 4-9 (2006) **(EI)**

23. Szu-Yi Chen ,**Ta-Ya Chu**, Chao-Jung Chen, Jenn-Fang Chen and Chin H. Chen " *High-Efficiency Inverted Transparent Blue Organic Light-Emitting Devices*" International Meeting on Information Display (***IMID'06***) Seoul, Korea, August 22-25, 2006 **(EI)**

24. Meng-Huan Ho, Chia-Ming Chang, **Ta-Ya Chu**, Chin H. Chen, *Highly Efficient Blue Organic Electroluminescent Devices*, SID International Symposium, Seminar, and Exhibition, (**SID'06**) Digest paper p29.2 San Francisco, USA, June 4-9, 2006 **(EI)**

25. **Ta-Ya Chu**, Meng-Huan Ho, Jenn-Fang Chen, Chin H. Chen *" Ab initio Molecular Orbital Calculation of 1,3,5-Triazine Derivatives as Hosts for Phosphorescent Organic Light Emitting Devices*" International Display Manufacturing Conference (**IDMC'05**), Taipei, February 21-24, 2005 **(EI)**

26. **Ta-Ya Chu,** Szu-Yi Chen, Jenn-Fang Chen, Chin H. Chen, "*Effective Structure of Electron Injection from ITO Bottom Cathode for Inverted OLED***"** International Meeting on Information Display (**IMID'05**) Digest paper p.972 (2005) Oral presentation, Seoul, Korea, July 19-23 **(EI)**

27. Meng-Huan Ho, Yao-Shan Wu, **Ta-Ya Chu**, Jenn-Fang Chen and Chin H. Chen*"*"*Stilbene-Based Materials for Blue Organic Light Emitting Devices*" International Display Manufacturing Conference (**IDMC'05**) 2005/2/21-24, Taipei, February 21-24, 2005 **(EI)**

Conference Presentation

28. **Ta-Ya Chu**, Jianping Lu, Serge Beaupre, Yanguang Zhang, Jean-Remi Pouliot, Salem Wakim, Jiayun Zhou, Mario Leclerc, Zhao Li, Jianfu Ding and Ye Tao, "High Efficient Polymer Solar Cells Achieved by a Low Bandgap Copolymer With a Large Open Circuit Voltage", 26th EU PVSEC in Hamburg, Germany, Sept. 6-10, 2011 **Oral Presentation**

29. **Ta-Ya Chu**, Salima Alem, Pierre G. Verly, Salem Wakim, Shing C. Tse, Jianping Lu, Ye Tao, Serge Beaupre, Mario Leclerc, Francis Belanger, Denis Desilets, Sheila Rodman, David Waller and Russell Gaudiana, "Polymer photovoltaic devices based on PCDTBT/Fullerene derivative bulk heterojunction structure", 25th EU PVSEC in Valencia, Spain, Sept. 6-10, 2010 **Oral Presentation**

30. **Ta-Ya Chu,** Szu-Yi Chen, Chao-Jung Chen, Jenn-Fang Chen, Chin H. Chen, *Highly Efficient and Stable Inverted Bottom-Emittion Organic Light Emitting Devices*, SID International

Symposium, Seminar, and Exhibition, (**SID'06**) Digest paper p29.2 San Francisco, USA, June 4-9 (2006) **Oral presentation**

31. **Ta-Ya Chu**, Szu-Yi Chen , Jenn-Fang Chen and Chin H. Chen "*Highly efficient of White Organic Light-Emitting Devices*" The 11th OptoElectronics and Communications Conference (OECC) (2006) **Oral Presentation**

32. **Ta-Ya Chu**, Jenn-Fang Chen, Chin H. Chen, "*Organic Semiconductor Study by First Principle Calculation*" Workshop on First-Principles Computational Materials Physics, Chi-Tou, Taiwan, July 27-29 (2005) **Oral presentation**

33. **Ta-Ya Chu**, Ito Chao, "Chemisorption of alkanedithioic on Au(111): A density functional theory study", The 20th S 4 (Symposium on Spectroscopy & Surface Sciences, Taiwan (2002) **Oral Presentation**

34. **Ta-Ya Chu**, S. Alem, S. Wakim, J. Lu, P. Verly and Y. Tao, "Developement of polycarbazole based high efficiency solar cells", 92nd Canadian Chemistry Conference and Exhibition in Hamilton, ON, May 30-June3, 2009
35. S. Alem, **Ta-Ya Chu**, S. Wakim, J. Lu, P. Verly and Y. Tao, "Developement of polycarbazole based high efficiency solar cells", 216th Meeting of The Electrochemical Society and 2nd International Symposium on Organic Semiconductor Materials, Devices and Processing" in Vienna, Austria, Oct. 4-9, 2009
36. **Ta-Ya Chu,** Szu-Yi Chen, Jenn-Fang Chen, Chin H. Chen "*Color Stable and Efficient White Organic Electroluminescent Device with Single Emitting Layer*" The 6th International Conference on Electroluminescence of Molecular Materials and Related Phenomena (***ICEL-6***), Hong Kong, August 7-10, 2006
37. Szu-Yi Chen ,**Ta-Ya Chu**, Jenn-Fang Chen and Chin H. Chen "*Highly Efficient of Inverted OLED With N-doped Electron Injection Layers*" , The 11th OptoElectronics and Communications Conference (***OECC***) Kaohsiung, July 3-7, 2006
38. **Ta-Ya Chu,** Szu-Yi Chen, Jenn-Fang Chen, Chin H. Chen, "*Reducing Electron Injection Barrier between Indium-Tin Oxide and Organic Material—Application in High-Efficiency Inverted Organic Light-Emitting Devices*", Taiwan Display Conference (***TDC***), Taipei, June 15-16, 2006
39. **Ta-Ya Chu**, Meng-Huan Ho, Yao-Shan Wu, Jenn-Fang Chen and Chin H. Chen "*Organic Electroluminance materials study by computational simulation*" The Fourth International OLED and PLED Workshop, Taipei, November 25-26, 2005 (**Best Poster Award**)
40. Meng-Huan Ho, Yao-Shan Wu, Shih-Feng Hsu, **Ta-Ya Chu**, Jenn-Fang Chen and Chin H. Chen "*Novel Host Materials for Phosphorescent Organic Light Emitting Devices*" International Display Workshop (**IDW '04**) Fukuoka, Japan, December, 2004
41. **Ta-Ya Chu**, Ito Chao, "A Density Functional Theory Study of Thiolate Adsorption Sites on Gold(111)", The 19th S 4 (Symposium on Spectroscopy & Surface Sciences, Taiwan, 2001

42. **Ta-Ya Chu**, Meng-Huan Ho, Yao-Shan Wu, Jenn-Fang Chen and Chin H. Chen “Organic Electroluminance materials study by computational simulation” The Fourth International OLED and PLED Workshop, Taipei, November 25-26, 2005 (Best Poster Award)
43. **Ta-Ya Chu**, Meng-Huan Ho, Jenn-Fang Chen, Chin H. Chen* " Ab initio Molecular Orbital Calculation of 1,3,5-Triazine Derivatives as Hosts for Phosphorescent Organic Light Emitting Devices" International Display Manufacturing Conference (IDMC'05), Taipei, February 21-24, 2005

Referees

Dr. Ye Tao
Group Leader, Printable Devices
Information and Communication Technologies
National Research Council Canada
ye.tao@nrc-cnrc.gc.ca
TEL:+1-613-998-2485

Dr. Ok-Keun Song
Manager, OLED Lighting R&D Centre,
Samsung Mobile Display, Korea
ok.song@samsung.com
TEL: +82-0184099583

Prof. Fred C. H. Chen
Director of Centre for Advanced Luminescence Materials,
Hong Kong Baptist University
fredchen@hkbu.edu.hk
TEL: +852-3411-5814