

CURRICULUM VITAE

Yuning Li

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Education

Ph.D. (Materials Science), Japan Advanced Institute of Science and Technology (JAIST), Japan, 1999

M.Sc. (Polymer Materials in Chemical Engineering), Dalian University of Technology, China, 1988

B.Sc. (Polymer Materials in Chemical Engineering), Dalian University of Technology, China, 1985

Current Academic Position

Professor, Department of Chemical Engineering, University of Waterloo, Waterloo, Canada

Other Affiliations

2019– Member, Waterloo Artificial Intelligence Institute (Waterloo.ai), University of Waterloo, Waterloo, Canada

2017– Member, Centre for Bioengineering and Biotechnology (CBB), University of Waterloo, Waterloo, Canada

2010– Member, Waterloo Institute for Nanotechnology (WIN), University of Waterloo, Waterloo, Canada

2011– Member, Waterloo Institute for Sustainable Energy (WISE), University of Waterloo, Waterloo, Canada

2011– Member, Institute for Polymer Research (IPR), University of Waterloo, Waterloo, Canada

2011– Cross-appointment, Department of Chemistry, University of Waterloo, Waterloo, Canada

Previous Positions Held

2015-2017 Associate Chair for Graduate Studies, Department of Chemical Engineering, University of Waterloo, Waterloo, Canada

2017-present Full Professor, Department of Chemical Engineering, University of Waterloo, Waterloo, Canada

2010–2017 Associate Professor, Department of Chemical Engineering, University of Waterloo, Waterloo, Canada

2008–2010 Senior Scientist, Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR), Singapore

2003–2008 Member of Research Staff, Xerox Research Centre of Canada (XRCC), Mississauga, Canada

2002–2003 NSERC Visiting Fellow, ICPET, National Research Council Canada (NRC), Ottawa, Canada

1999–2001 Postdoctoral Fellow, Department of Chemistry, Simon Fraser University, Canada

1993–1997 Production Engineer, Toyo Textiles Industries, Inc., Kanazawa, Japan

1990–1993 Lecturer, Department of Polymer Materials, Dalian University of Technology, China

1988–1990 Assistant Lecturer, Department of Polymer Materials, Dalian University of Technology, China

Teaching

ChE102: Chemistry for Engineers (undergraduate core course)

ChE241: Materials Science and Engineering (Chemical Engineering undergraduate core course)

ChE330: Chemical Engineering Thermodynamics (Chemical Engineering undergraduate core course)

ChE640: Principle of Polymer Science (Chemical Engineering graduate course)
ChE745: Research Topics in Polymer Science and Engineering: Synthetic methods for pi-conjugated polymers (Chemical Engineering graduate reading course)
ECE109: Materials Chemistry for Engineers (Electrical and Computer Engineering undergraduate course)
NE125: Introduction to Materials Science and Engineering (Nanotechnology undergraduate core course)
NE499: Materials for printed electronics: Special Topics in Nanostructured Materials (Nanotechnology undergraduate elective course)

Memberships and Professional Service

Royal Society of Chemistry (UK) (2015–)
Association of Professional Engineers Ontario (2015–)
Editor, Special Issue: Functionalized Organic Thin Film Transistors for Sensing in Chemosensors (2020-2021)
Editorial Board Member of Section "Solar Energy and Solar Cells" in *Nanomaterials* (2021-)
Editorial Board Member, *Current Electrochemistry* (2021-)
Editorial Board Member, *International Journal of Nano Studies and Technology (IJNST)* (2018-)
Editorial Board Member and Academic Editor, *Electronics* (2017–)
Editorial Board Member, *AIMS Environmental Science* (2013–)
Editorial Board Member, *Scientific Canadian* (2013–)
Associate Editor, *Materials Focus* (2012–)
Advisory Board Member of *Organic Photonics and Photovoltaics* (2012 –)
Guest Co-Editor *Advances in Polymer Technology* on special issue “Polymeric Materials for Energy Storage and Conversion (PMESC)” (2019-2020)
Guest Co-Editor for a special issue on “Nano-Engineered Materials for Energy and Environmental Applications” for the *Journal of Nanoengineering and Nanomanufacturing (JNAN)* (2011)
Member of Editorial Board, *Advances in Nanoparticles* (2013–)
American Chemical Society (1999–)
Materials Research Society (2001–)
Chemical Institute of Canada (2000–)
Reviewing >20 research articles per year requested by peer reviewed journals (e.g., *Science*, *JACS*, *Adv. Mater.*, *Energy Environ. Sci.*, *Chem. Commun.*, *Macromolecules*, etc.)

Awards and Certifications

2018 Albert Nelson Marquis Lifetime Achievement Award
Faculty of Engineering Distinguished Performance Award, University of Waterloo (2016)
Engineering Research Excellence Award, University of Waterloo (2015)
Professional Engineer, Professional Engineers Ontario (PEO) (2015–)
Inclusion in the Marquis Who's Who in the World (2013-2018)
Inclusion in the Academic Keys Who's Who in Engineering Higher Education (WWEHE) (2013)
The NJC (National Junior College) Partners Award for “Commendable services which contributed to the holistic development of the students”, Singapore (2010)
Design for Lean Six Sigma Green Belt (2007)
Co-recipient of the 3rd Annual NASA Nanotech Briefs Nano 50 Awards for Printed Organic Electronics in the Technologies category (*technology breakthroughs that have, or are expected to have, a significant impact in one or more application areas*) (2007)
Appreciation Award for “Development of next generation organic semiconductors”, Xerox Corp. (2005)

Co-recipient of the 2nd Runner Up in Materials Category of "The Best and the Brightest New Technology for 2004" for the development of "Plastic integrated circuits, which could be produced at much lower cost than their silicon counterparts" by the *Wall Street Journal* (2004)

Achievement Award for "Developing printable silver nanoparticles", Xerox Corp. (2004)

Special Recognition Award for "Advancing the materials technology for printed electronic research", Xerox Corp. (2004)

Appreciation Award for "Development of printable conductive nanoparticles", Xerox Corp. (2003)

Visiting Fellowships in Canadian Government Laboratories (VF), NSERC, Canada (2002–2003)

Graduation with Distinction, Japan Advanced Institute of Science and Technology, Japan (1999)

The Rotary Yoneyama Foundation Doctoral Scholarship, Japan (1999–2000)

Doctoral Scholarship, The Association of International Education, Japan (1997–1999)

Current Research Interests

Design and molecular engineering of polymer materials and nanomaterials for electronic/electrical applications

- Organic thin film transistors (OTFTs)
- Polymer bulk-heterojunction photovoltaics (OPV) or organic solar cells (OSCs)
- Small molecule-based OSCs
- Dye-sensitized solar cells (DSC)
- Perovskite solar cells
- Organic light-emitting diodes (OLEDs)
- Chemical/biosensors and photo-detectors
- Organic photodetectors
- Lithium sulfur, ion and other batteries

Design, fabrication and characterization of electrical and electronic devices

- OTFTs and their logic circuits for e-paper, displays, etc.
- Organic solar cells
- Organic photo, chemical and biological sensors
- Lithium sulfur, ion and other batteries

Research and scholarly achievements

Publications

Articles published in refereed journals

J185 Zhong, L.; Wang, S.; Xiao, M.; Liu, W.; Han, D.; Li, Z.; Qin, J.; Li, Y.; Zhang, S.; Huang, S.; Meng, Y. "Addressing interface elimination: boosting comprehensive performance of all-solid-state Li-S battery". *Energy Storage Materials* **2021**, *41*, 563-570.

J184 Wang, R.T.; Xu, A.F.; Li, W.; Li, Y.; Gu, X. Moisture-Stable FAPbI₃ Perovskite Achieved by Atomic Structure Negotiation. *J. Phys. Chem. Lett.* **2021**, *12*, 5332–5338

J183 He, K.; Kumar, P.; Zhang, Z.; Li, X.; Liu, H.; Wang, J.; Li, Y. "A wide bandgap polymer donor composed of benzodithiophene and oxime substituted thiophene for high-performance organic solar cells", *ACS Appl. Mater. Interfaces* **2021**, *13*, 26441–26450.

J182 Ma, Z.; Zuo, Z.; Li, Y. "Zinc Complex-Based Multifunctional Reactive Lithium Polysulfide Trapper Approaching Its Theoretical Efficiency", *ACS Appl. Mater. Interfaces* **2021**, *13*, 23936–23944.

J181 Binaeian, E.; Li, Y.; Tayebi, H.-A.; Yuan, D. Enhancing toxic gas uptake performance of Zr-based MOF through uncoordinated carboxylate and copper insertion; ammonia adsorption, *J. Hazard. Mater.*, **2021**, *416*, 125933.

- J180 She, Z.; Gad, M.; Ma, Z.; Li, Y.; Pope, M. "Enhanced Cycle Stability of Crumpled Graphene Encapsulated Silicon Anodes via Polydopamine Sealing", *ACS Omega*, **2021**, *6*, 12293–12305.
- J179 Binaeian, E.; Li, Y.; Yuan, D. "Improving ammonia uptake performance of zirconium-based metal-organic frameworks through open metal site insertion strategy", *Chemical Engineering Journal* **2021**, *421*, 129655.
- J178 Xi, G.; Xiao, M.; Wang, S.; Han, D.; Li, Y.; Meng, Y. "Polymer-based Solid Electrolytes: Material Selection, Design and Application" *Adv. Funct. Mater.*, **2021**, *31*(9), 2007598.
- J177 Gao, X.; Guo, C.; Ma, Z.; Xi, G.; Meng, Y.; Li, Y. "Boosting Li-S battery performance with an in-cell electropolymerized conductive polymer" *Mater. Adv.* **2021**, *2*, 974-984.
- J176 Ngai, J. H. L.; Gao, X.; Kumar, P.; Polena, J.; Li, Y. "A Highly Stable Diketopyrrolopyrrole (DPP) Polymer for Chemiresistive Sensors" *Adv. Electron. Mater.* **2021**, *7*, 2000935.
- J174 He, K.; Kumar, P.; Yuan, Y.; Li, Y. "Wide bandgap polymer donors for high efficiency non-fullerene acceptor based organic solar cells". *Mater. Adv.* **2021**, *2*, 115-145.
- J174 Li, S.; He, K.; Prince, E.; Li, Y.; Seferos, D. "Selenophene and Thiophene-based Conjugated Polymer Gels". *ACS Materials Letters* **2020**, *2*, 1617–1623. DOI: 10.1021/acsmaterialslett.0c00406.
- J173 He, K.; Kumar, P.; Abd-Ellah, M.; Liu, H.; Li, X.; Zhang, Z.; Wang, J.; Li, Y. Alkyloxime side chain enabled polythiophene donors for efficient organic solar cells. *Macromolecules* **2020**, *53*, 8796–8808.
- J172 Ma, Z.; Gao, X.; She, Z.; Pope, M.A.; Li, Y. Ultrasmall TiO_x Nanoparticles Rich in Oxygen Vacancies Synthesized by a Simple Strategy for Ultrahigh-Rate Lithium Ion Batteries. *ChemElectroChem*, **2020**, *7*, 4124-4130.
- J171 Sarkar, T.; Schneider, S.A.; Ankonina, G.; Hendsbee, A.D.; Yuning Li, Y.; Toney, M.F.; Frey, G.L. Balanced hole and electron transport in semiconducting polymers by controlling intra and intermolecular interactions. *Chem. Mater.* **2020**, *32*, 17, 7338–7346. Doi: doi.org/10.1021/acs.chemmater.0c02199.
- J170 Mamone, M.; Bura, T.; Brassard, S.; Soligo, E.; He, K.; Li, Y.; Leclerc, M. Optimized synthesis of fluorinated dithienyl-diketopyrrolopyrroles and new copolymers obtained by direct heteroarylation polymerization. *Mater. Chem. Front.* **2020**, *4*, 2040-2046. DOI: 10.1039/D0QM00218F.
- J169 Bennett, R.; Hendsbee, A.; Ngai, J. H. L.; Ganguly, A.; Li, Y.; Kelly, T. Bisisoindigo-Benzothiadiazole Copolymers: Materials for Ambipolar and n-Channel OTFTs with Low Threshold Voltages. *ACS Applied Electronic Materials* **2020**, *2*, 2039–2048.
- J168 Zhang, Y.; Sui, H.; Li, Y.; Wen, J. Energetic characteristics of the Al/CuO core-shell composite micro-particles fabricated as spherical colloids, *Thermochimica Acta*, **2020**, *689*, 178656.
- J167 Huang, X.; Xue, J.; Xiao, M.; Wang, S.; Li, Y.; Zhang, S.; Meng, Y. Comprehensive evaluation of safety performance and failure mechanism analysis for lithium sulfur pouch cells. *Energy Storage Materials*, **2020**, *30*, 87-97.
- J166 He, K.; Li, X.; Liu, H.; Zhang, Z.; Kumar, P.; Ngai, J.H.L. Wang, J.; Li, Y. A Novel D-A Polymer with a Donor-backbone – Acceptor-side-chain Structure for Organic Solar Cells. *Asian J. Org. Chem.* **2020**, *9*, 1301-1308 (accepted April 16, 2020) (VIP article)
- J165 Ganguly, A.; He, K.; Hendsbee, A.D.; Abdelsamie, M.; Bennett, R.N.; Li, Y.; Toney, M.F.; Kelly, T.L. Synthesis of Poly(bisisoindigo) Using a Metal-Free Aldol Polymerization for Thin-Film Transistor Applications. *ACS Appl. Mater. Interfaces* **2020**, *12*, 14265-14271.
- J164 Bixi, S.; Melville, O.A.; Mirka, B.; He, Y.; Hendsbee, A.D.; Li, Y.; Lessard, B.H. Air and temperature sensitivity of n-type polymer materials to meet and exceed the standard of N2200. *Sci. Rep.* **2020**, *10*(1), 4014.
- J163 Baig, S.; Kumar, P.; Ngai, J.; Li, Y.; Ahmed, S. Yttrium Doped Copper (II) Oxide Hole Transport Material as Efficient Thin Film Transistor. *ChemPhysChem* **2020**, *21*, 895-907.

- J162 Wang, G.; Kumar, P.; Zhang, Z.; Hendsbee, A.D.; Liu, H.; Li, X.; Wang, J.; Li, Y. Facile synthesis of a semiconducting bithiophene-azine polymer and its application for organic thin film transistors and organic photovoltaics. *RSC Adv.* **2020**, *10*, 12876-12882.
- J161 Lu, J.; Dadvand, A.; Chu, T.-Y.; Bortolus, M.; Movileanu, R.; Baribeau, J.-M.; Tao, Y.; Quinn, J.; Li, Y. New 3,7-Bis(2-oxindolin-3-ylidene)benzo[1,2-b:4,5-b']difuran-2,6-dione Dicyanides with Engineered Side Chains for Unipolar n-Type Transistors. *ACS Appl. Electron. Mater.* **2020**, *2*, 103-110.
- J160 Fazaeli, R.; Yan, L.; Li, Y. 3-D Hierarchical nanosheet Ni-Fe/CFP as a novel cathode for Lithium Sulfur Batteries. *J. Iran. Chem. Soc.* **2020**, *17*, 545-553.
- J159 Wang, C.; Wei, P.; Ngai, J. H. L.; Rheingold, A. L.; Gray, T. G.; Li, Y.; Pentzer, E.; Li, R.; Zhu, L.; Sauv e, G. Zinc(II) Complex of Di(naphthylethynyl)azadipyrromethene with low synthetic complexity leads to OPV with high industrial accessibility. *J. Mater. Chem. A* **2019**, *7*, 24614-24625.
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- J156 Zhou, X.; Zhang, Z.; Hendsbee, A. D.; Ngai, J. H. L.; Kumar, P.; Ye, S.; Seferos, D. S.; Li, Y. [2,2'-Bithiophene]-4,4'-dicarboxamide: A novel building block for semiconducting polymers. *RSC Adv.* **2019**, *9*, 30496-30502.
- J155 Guo, K.; Wu, B.; Jiang, Y.; Wang, Z.; Liang, Z.; Li, Y.; Deng, Y.; Geng, Y. Synthesis of an isomerically pure thienoquinoid for unipolar n-type conjugated polymers: Effect of backbone curvature on charge transport performance. *J. Mater. Chem. C* **2019**, *7*, 10352-10359.
- J154 Ngai, J.H.L.; Chang, G. Y.; Gao, X. G.; Zhou, X.; Hendsbee, A. D.; Li, Y. Design and synthesis of stable indigo polymer semiconductors for organic field-effect transistors with high fluoride sensitivity and selectivity. *RSC Adv.* **2019**, *9*, 26230-26237.
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- J152 Aineband, S.; Nouri, E.; Mohammadi, M.R.; Li, Y. Performance of CoTiO₃ as an oxide perovskite material for light scattering layer of dye- sensitized solar cells. *New J. Chem.* **2019**, *43*, 3760-3768.
- J151 Yang, Y.; Prizker, M.; Li, Y. Electrodeposited p-type Cu₂O thin films at high pH for all-oxide solar cells with improved performance. *Thin Solid Films* **2019**, *676*, 42-53.
- J150 Kynaston, E.L.; Winchell, K.J.; Yee, P.Y.; Manion, J.G.; Hendsbee, A.D.; Li, Y.; Huettner, S.; Tolbert, S. H.; Seferos, D.S. Poly(3-alkylthiophene)-*block*-Poly(3-alkylselenophene)s: Conjugated Diblock Copolymers with Atypical Self-Assembly Behavior. *ACS Appl. Mater. Interfaces* **2019**, *11*, 7174-7183.
- J149 Chen, S.; Meng, Y.; Li, Y.; Qu, B.; Zhuo, D. Effect of the length and branching point of alkyl side chains on DPP-thieno[3,2-b]thiophene copolymers for organic thin-film transistors. *Optical Materials* **2019**, *88*, 500-507.
- J148 Chen, S.; Wei, X.; Luo, Y.; Chen, Y.; Li, Y.; Zhuo, D. Relative reactivities of epoxide monomers during copolymerization with carbon dioxide, *Advanced Industrial and Engineering Polymer Research* **2019**, *2*, 178-185
- J147 Radford, C.L.; Hendsbee, A.D.; Abdelsamie, M.; Randell, N.M.; Li, Y.; Toney, M.F.; Kelly, T.L. Effect of Molecular Shape on the Properties of Non-Fullerene Acceptors: Contrasting Calamitic Versus 3D Design Principles. *ACS Appl. Energy Mater.* **2018**, *1*, 6513-6523.

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- J142 Hendsbee, A.D.; Li, Y. Performance Comparisons of Polymer Semiconductors Synthesized by Direct (Hetero)Arylation Polymerization (DHAP) and Conventional Methods for Organic Thin Film Transistors and Organic Photovoltaics. *Molecules* **2018**, 23(6), 1255.
- J141 Huang, S.; Meng, C.; Xiao, M.; Ren, S.; Wang, S.; Han, D.; Li, Y.; Meng, Y. Pseudocapacitive Sodium Storage by Ferroelectric Sn₂P₂S₆ with Layered Nanostructure. *Small* **2018**, 14, 1704367.
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- J139 Hu, L.; Han, J.; Qiao, W.; Zhou, X.; Wang, C.; Ma, D.; Li, Y.; Wang, Z.Y. Side-chain engineering in naphthalenediimidebased n-type polymers for high-performance all-polymer photodetectors. *Polym. Chem.*, **2018**, 9, 327-334.
- J138 He, Y.; Quinn, J.T.E.; Hou, D.; Ngai, J.H.L.; Li, Y. A small bandgap (3*E*,7*E*)-3,7-bis(2-oxoindolin-3-ylidene)benzo[1,2-*b*:4,5-*b'*]difuran-2,6(3*H*,7*H*)-dione (IBDF) based polymer semiconductor for near-infrared organic phototransistors. *J. Mater. Chem. C*, **2017**, 5, 12163-12171.
- J137 Huang, S.; Meng, C.; Xiao, M.; Ren, S.; Wang, S.; Han, D.; Li, Y.; Meng, Y. Multi-shell Tin Phosphide Nanospheres as High Performance Anode Material of Sodium Ion Battery. *Sustainable Energy Fuels* **2017**, 1, 1944-1949.
- J136 Bura, T.; Beaupré, S.; Ibraikulov, Q.A.; Légaré, M.A.; Quinn, J.; Lévêque, P.; Heiser, T.; Li, Y.; Leclerc, N.; Leclerc, M. New Fluorinated Dithienyldiketopyrrolopyrrole Monomers and Polymers for Organic Electronics, *Macromolecules*, **2017**, 50 (18), 7080–7090.
- J135 Jesse T. E. Quinn, Fezza Haider, Haritosh Patel, Daid A. Khan, Zhi Yuan Wang, and Yuning Li, Ultrafast photoresponse organic phototransistors based on pyrimido[4,5-*g*]quinazoline-4,9-dione polymer. *J. Mater. Chem. C*, **2017**, 5, 8742-8748.
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- J133 Quinn, J.T.E.; Guo, C.; Haider, F.; Patel, H.; Khan, D.A.; Li, Y. Regioisomerism of alkyl-substituted bithiophene comonomer in (3*E*,8*E*)-3,8-bis(2-oxoindolin-3-ylidene)naphtho-[1,2-*b*:5,6-*b'*]difuran-2,7(3*H*,8*H*)-dione (INDF) based D-A polymers for organic thin film transistors. *J. Mater. Chem. C*, **2017**, 5, 5902-5909. (Included in the Hot Article 2017 web collection for *JMCC*.)
- J132 Le Borgne, M.; Quinn, J.; Martin, J.; Stingelin, N.; Li, Y.; Wantz, G. New 3,3'-(ethane-1, 2-diylidene)bis(indolin-2-one) (EBI)-based small molecule semiconductors for organic solar cells. *J. Mater. Chem. C* **2017**, 5, 5143-5153.

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- J118 Zhang, J.; Xiao, P.; Dumur, F.; Guo, G.; Hong, W.; Li, Y.; Gigmès, D.; Graff, B.; Fouassier, J.-P. ; Lalevée, J. A New Search towards High Performance Visible Light Photoinitiating Systems. *Macromol. Chem. Phys.* **2016**, *217*, 2145-2153.
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