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Qualifications
Croucher Research Fellow, University of Cambridge (with Profs. Lord Lewis, FRS and Paul R. Raithby) (1997); Postdoc, Texas A&M University (with Prof. F. Albert Cotton) (1996); PhD, HKU (with Prof. Wing-Tak Wong) (1995); BSc (First Class Honours), HKU (1992)

Previous and Present Positions
In HKBU: Assistant Professor (1998-2003); Associate Professor (2003-07); Professor (2007-11); Chair Professor (2011-16); Elizabeth Law Endowed Chair of Advanced Materials (2015-16); Head of Chemistry (2014-16); ***In PolyU***: Chair Professor of Chemical Technology (2016-); Clarea Au Professor in Energy (2018-); Associate/Interim Dean, Faculty of Applied Science & Textiles (2016-21); Dean, Faculty of Science (2021-)

Research Interests and Profile
Synthetic inorganic and organometallic chemistry of d- and f-block elements, functional metallopolymers and metallophosphors with applications in electronics, optoelectronics and catalysis

- **Publications:** 823 papers (*Nature* group ×3, *JACS* ×9, *Angew. Chem.* ×15, *Adv. Mater.* ×11, *Adv. Funct. Mater.* ×12; *Chem. Soc. Rev.* ×7, *Adv. Sci.* ×5); > 40 invited reviews in *Chem. Soc. Rev.*, *Acc. Chem. Res.*, *Adv. Mater.*, *Prog. Mater. Sci.*, *Mater. Sci. Eng. R*, *Coord. Chem. Rev.*; 3 US and 2 China patents granted
- **Citation data:** H-index = 90; citations > 36,000 (WoS); H-index = 92; citations > 38,000 (Scopus).
- **Books:** "*Molecular Design and Applications of Photofunctional Polymers and Materials*", RSC, UK, **2012**; "*Organometallics and Related Molecules for Energy Conversion*", Springer-Verlag, Berlin Heidelberg, **2015**; "*Macromolecules Incorporating Transition Metals: Tackling Global Challenges*" (Polymer Chemistry Series No. 27), RSC, UK, **2018**; "*One-Dimensional Mesoporous Inorganic Nanomaterials*", Springer Nature, Switzerland, **2022**; "*Functional Nanomaterials: Synthesis, Properties and Applications*", Wiley-VCH, Weinheim, Germany, **2022**; "*Optical and Optoelectronic Polymers*", RSC, UK, **2024**.
- **Funding:** Over HK$57.7M (~ Euro$6.97M) of external funding from governments and private funding bodies. Some big and prestigious grants include Senior Research Fellowship (HK$7.8M), Collaborative Research Fund (HK$7.9M) and Areas of Excellence Scheme (HK$8.9M, as co-PI) by RGC in HK.

Major Research Recognition and Awards
RGC Senior Research Fellow Award (2020); Thomson Reuters/Clarivate Highly Cited Researcher (2014–20); World's top 2% most-cited scientists by Stanford citation ranking (2019-); Founding Member of the Hong Kong Young Academy of Sciences (2018); JPA Lectureship Award for Asian and Oceanian Photochemist, Japan (2014); State Natural Science Award (Second Class), State Council, P.R. China (2013); Ho Leung Ho Lee Foundation Prize for Scientific and Technological Innovation (2012); Distinguished Lectureship Award, The Chemical Society of Japan (2012); Distinguished Young Chemist Award, Federation of Asian Chemical Societies (2011); Natural Science Award, Ministry of Education, P.R. China (First Class 2010; Second Class 2022); Chemistry of the Transition Metals Award, RSC (2010); Croucher Senior Research Fellowship Award, The Croucher Foundation (2009); Fellow of Royal Society of Chemistry (2005).

Leadership and International Standing
- **Plenary/Keynote/Award/Invited Lectures:** 14 plenary, 14 keynote, 7 award and 84 invited lectures at scientific meetings (ACS National Meeting, PacifiChem Congress, Asian Chemical Congress, Pacific Polymer Conference, International Conference on Coordination Chemistry (ICCC) and Organometallic Chemistry (ICOMC), etc.). Plenary Lectures include 4th International Conference on Cutting-Edge Organic Chemistry in Asia, 2009, Bangkok, Thailand; 3rd SuNE - Sun New Energy Conference, 2013, Santa Flavia, Sicily, Italy; 4th International Conference on the Physics of Optical Materials and Devices, 2015, Budav, Montenegro; 18th International Workshop on Inorganic and Organic Electroluminescence, 2016, Taiyuan, China; Metal-Containing and Metallo-supramolecular Polymers and Materials VI, 254th ACS National Meeting, 2017, Washington D.C., USA; 11th Phosphor Safari, 2019, Xiamen, P.R. China.
- **Invited Editorships:** Associate Editor, *Journal of Materials Chemistry C* (2013-22), *Materials Advances* (2020-22) and *Energy Advances* (2023-) (RSC)**;** Editor, *Journal of Organometallic Chemistry* (2013-) (Elsevier); Editor-in-Chief, *Topics in Current Chemistry* (2015-) (Springer); Series Editor of RSC Polymer

Series (2021); Current editorial/international advisory board member of *EnergyChem, EcoMat, Innovation Mater., Chem. Rec., Sci. China Chem., Macromol. Rapid Commun., Macromol. Chem. Phys., Chem. Asian J., Dalton Trans., Mol. Syst. Des. Eng., Comments Inorg. Chem., J. Inorg. Organomet. Polym. Mater., Polym. Bull., J. Cluster Sci.*, etc.. Previous board member of *Adv. Opt. Mater., Polym. Chem., Dyes Pigm.*.

- **Invited Appointments:** President, Hong Kong Chemical Society (2007-); Secretary, Royal Society of Chemistry (HK Section) (2008-14); Member, RGC Physical Science Panel (2012-18); Member, RGC Physical Science Panel of Competitive Research Funding Schemes for the Local Self-financing Degree Sector, (2020-); Council Member, Federation of Asian Chemical Societies (FACS) (2007-); Council Member, Pacific Polymer Federation (2013-); Society Member, Asian Chemical Editorial Society (2007-).
- **Conference Organization:** Co-chair for "Functional π-Systems, Materials and Devices" in the 8th International Conference on Materials for Advanced Technologies of the Materials Research Society of Singapore (2015); Co-chair for "Electron Transfer and Electrochemistry of Inorganic and Organometallic Materials" in the International Chemical Congress of Pacific Basin Societies, Honolulu, Hawaii, USA (2015); Co-chair for the Phosphors Safari 2016: International Symposium on Luminescence, Spectroscopy and Applications, Hong Kong (2016); Co-chair for "Coordination Chemistry for Energy and Enviroment" and "Metallo-Supermolecules and Metal Containing Polymers" in the ICCC in Sendai, Japan (2018)
- **Research Advisor:** Wong is deeply committed to education, training and researcher development. He has trained 35 PhD and 8 MPhil graduates and is currently supervising 13 PhD students. Many of his graduates are working as full professors in major universities in HK and Mainland China.
- **Contributions to Science in Europe:** Wong did his postdoctoral in the University of Cambridge and since then, he keeps on the long-term collaboration with Prof. Raithby in Bath. Extensive collaborations and student exchange with other colleagues in Europe (e.g. Ian Manners in Bristol, Nick Long in London, Todd Marder in Durham/Würzberg, Ulrich Schubert in Jena) resulted in > 40 high-quality publications. Wong also had two joint grants on exchange programmes with Manners (funded by Royal Society) and Schubert (funded by RGC/DAAD). He also served as panelists and reviewers for a number of funding bodies in Europe including Austrian Science Fund, Italian Ministry of Education, Universities and Research Fund, Science Foundation Ireland Programme, Czech Science Foundation Fund, ANR Grant in France, etc. For many years, Wong serves as the associate editor and series editor for journals and books published by RSC.

Research Excellence and Originality

Prof. Wong is a world-leader in the study of organometallic optoelectronic polymers and molecules. His new materials are very useful in energy-generating (solar cells) and energy-saving (OLEDs) applications. He has made remarkable contributions in the development of multifunctional metallopolymers and metallophosphors with photofunctional properties and energy functions. He has spent decades to advance energy science by using these materials in developing technologies to promote efficient generation and consumption of energy. His innovative works have led to a number of major scientific breakthroughs with the mission towards a sustainable society. Below is a summary of the two main research themes by Wong's group.

(A) Multifunctional Polymetallaynes

Metallopolymers are interesting multifunctional materials with emerging applications in energy-related, optical and magnetic devices. They combine the processing advantages of synthetic polymers with the functionality provided by the presence of metal centres that can bring the best of both worlds together. The propensity towards exhibiting metal-metal interactions can also provide additional means for manipulating the structural order and electronic coupling in these molecules. Known for his research in polymetallaynes with photofunctional properties, such materials can be used to sample triplet emission from soluble and processable materials and are recognized for their exciting functional properties, structural variability and applications as highly transparent optical power limiters, efficient converters for light/electricity signals, patternable precursors to magnetic metal alloy nanoparticles for magnetic data storage. His team has also made unique contributions in elucidating the structure-property-function relationships of the triplet excited states at the molecular level and fine-tuning the triplet level over a wide energy range through optimization of the spacer group. This research area is one of his best recognized scholarly contributions to date (*Chem. Soc. Rev.*, **2016**, *45*, 5264; *Chem. Soc. Rev.*, **2018**, *47*, 4934; *Chem. Soc. Rev.*, **2019**, *48*, 5547.).

Among these, Wong has done pioneering work on the photovoltaic applications of organometallic polymers. The seminal paper (**#1**, 531 cites) has set a new milestone towards high-efficiency polymer solar cells to capture sunlight for efficient electrical power generation, which contrasts with the commonly used purely organic donor materials. His group has developed a novel strategy that allows for tuning of the optical

absorption and charge transport properties as well as the solar cell efficiency of these metallopolyynes using different number of thienyl rings (**#2**, 235 cites). Furthermore, another breakthrough of using polymetallaynes is to develop highly transparent optical limiters (**#3**, 121 cites), resulting in minimal absorption in the visible region, so that the material reduces the intensity of the laser beam, while allowing most of the color from the original laser to pass through. This means that they are more suitable for making eye and optical device protectors. While metallopolymer precursors to polymetallic NPs have proven more difficult to synthesize, Wong's group nicely developed a simple one-step synthesis of ferromagnetic FePt nanoparticles (NPs) from a film-forming bimetallic polymer precursor, which can be utilized directly as a template to fabricate FePt NP array patterns by different lithographic patterning protocols (*Angew. Chem. Int. Ed.* **2008**, *47*, 1255 for photo- and electron-beam lithography; **#4**, 132 cites for nanoimprint lithography). This can serve as a good platform for fabricating future ultrahigh-density perpendicular magnetic data recording system where convenient and rapid nanopatterning of magnetic NPs at low cost is highly essential.

Very recently, his team has also made another seminal work on the bottom-up synthesis and applications of free-standing 2D metallated graphynes (**#5**, 42 cites) which represent a class of new 2D functional carbon-rich materials. Further research in these emerging areas has spurred new developments in the production of renewable energy via photo-/electro-catalysis (**#6**, 15 cites; *Nano Energy* **2022**, *43*, 101428). Since then, this has stimulated intensive research activities around the world in this exciting field.

(B) Metallophosphors as OLED and Stimuli-Responsive Materials

Organic light-emitting devices (OLEDs) which are able to convert electrical energy into light energy have been hailed as the next generation of energy-saving display and solid-state lighting technologies. Although there is a large body of literature information about phosphorescent iridium(III) and platinum(II) complexes, utilization of their derivatives playing multifunctional roles for electrophosphorescent OLEDs was not well elucidated and remains to be studied. To fill this gap, Wong's group takes advantage of the characteristic of metal groups (such as long-lived luminescence, large Stokes shift and high photostability) coupled with the bipolar character of new charge balance ligand systems. They have reported highly efficient OLEDs derived from 2-[3-(*N*-arylcarbazolyl)]pyridine and this approach can facilitate hole transport and enhance device efficiencies by about 55% as compared to the prototypical *fac*-[Ir(ppy)$_3$] (*Angew. Chem. Int. Ed.* **2006**, *45*, 7800).

A dilemma facing dopant-based red OLEDs was realized in which efficient and bright dopants are not red enough, and red-enough dopants are not efficient and bright. Optimization of the OLED efficiency/color purity trade-off is thus a key issue. Highly efficient pure red OLEDs based on multi-component iridium electrophosphors functionalized with hole-transporting carbazole modules and triphenylamine dendrons have been reported by Wong in another two seminal papers. These bifunctional complexes and dendrimers offer an attractive avenue to developing metal phosphors with optimized efficiency/color purity trade-offs for pure red-emitting devices (*Adv. Funct. Mater.* **2008**, *18*, 319; ***#7***, 342 cites).

A new and versatile strategy was developed by Wong for the phosphorescence color tuning of cyclometalated iridium phosphors by simple tailoring of the phenyl ring of ppy with various main-group moieties in [Ir(ppy-X)$_2$(acac)] and [Ir(ppy-X)$_3$] (X = B(Mes)$_2$, SiPh$_3$, GePh$_3$, NPh$_2$, POPh$_2$, OPh, SPh, SO$_2$Ph). This can be achieved by shifting the charge-transfer character from the pyridyl groups in traditional iridium ppy-type complexes to the electron-withdrawing main-group units, which is conceptually different from the classical color tuning protocols in the literature. This color tuning strategy using electron-withdrawing main-group moieties provides a novel access to iridophosphors with improved electron injection/electron transporting features essential for highly efficient, color-switchable OLEDs (**#8**, 473 cites).

While white OLEDs are a green technology with huge interest because as well as their high efficiency, they also consume much lower levels of power. Since fluorescent lamps involve the use of mercury and its disposal is challenging, many scientists have been working aggressively to make the replacement of the fluorescent light sources by white polymer light-emitting devices (WPLEDs) a reality. However, the application of WPLEDs is still severely hampered by the relatively low device efficiency. Wong et al. have set numerous world records for solution-processed two-color WPLEDs with the maximum power efficiency (PE at 68.5 lm/W without light out-coupling and 96.3 lm/W at 1,000 cd/m^2 with light out-coupling) as efficient and competitive as that of the fluorescent lamp (with typical PE of 40-70 lm/W) and this cutting-edge technology holds a great promise for the use as large-area, flexible and enviromentally-friendly solid-state light sources for the future (**#9**, 307 cites; **#10**, 343 cites; *iScience* **2018**, *6*, 128).

Wong is also instrumental in developing a series of phosphorescent soft salts with applications in diverse optoelectronic fields such as chemosensing, photodynamic therapy, electroluminochromism, stimuli-responsive luminescence, etc. (*Chem. Sci.* **2016**, *7*, 3338; *Chem. Commun.* **2020**, *56*, 11681; *JACS* **2021**, *143*, 18317).

Publications (citation data extracted from Web of Science dated 17 October 2023)

(1) W.-Y. Wong*, X.-Z. Wang, Z. He, A. B. Djurišić*, C.T. Yip, K.Y. Cheung, H. Wang, C.S.K. Mak and W.-K. Chan, "Metallated Conjugated Polymers as a New Avenue Towards High-Efficiency Polymer Solar Cells", Nature Mater., 2007, 6, 521-527. (Impact factor: 41.2; Citations: 531) https://doi.org/10.1038/nmat1909

(2) W.-Y. Wong*, X.-Z. Wang, Z. He, K.-K. Chan, A. B. Djurišić*, K.-Y. Cheung, C.-T. Yip, A. M.-C. Ng, Y. Y. Xi, C. S. K. Mak and W.-K. Chan, "Tuning the Absorption, Charge Transport Properties and Solar Cell Efficiency with the Number of Thienyl Rings in Platinum-containing Poly(aryleneethynylene)s", J. Am. Chem. Soc., 2007, 129, 14372-14380. (Impact factor: 15; Citations: 235) https://doi.org/10.1021/ja074959z

(3) G.-J. Zhou, W.-Y. Wong*, Z. Lin and C. Ye, "White Metallopolyynes for Optical Limiting/Transparency Trade-off Optimizatio", Angew. Chem. Int. Ed., 2006, 45, 6189-6193. (Impact factor: 16.6; Citations: 121) https://doi.org/10.1002/anie.200601651

(4) Q. Dong, G. Li, C.-L. Ho, M. Faisal, C.-W. Leung, P. W.-T. Pong*, K. Liu, B.-Z. Tang, I. Manners* and W.-Y. Wong*, "A Polyferroplatinyne Precursor for the Rapid Fabrication of L10-FePt-type Bit Patterned Media by Nanoimprint Lithography", Adv. Mater., 2012, 24, 1034-1040. (Impact factor: 29.4; Citations: 132) https://doi.org/10.1002/adma.201104171

(5) L. Xu, J. Sun, T. Tang, H. Zhang, M. Sun, J. Zhang, J. Li, B. Huang, Z. Wang*, Z. Xie* and W.-Y. Wong*, "Metallated Graphynes as a New Class of Photofunctional 2D Organometallic Nanosheets", Angew. Chem. Int. Ed., 2021, 60, 11326-11334. (Impact factor: 16.6; Citations: 42) https://doi.org/10.1002/anie.202014835

(6) M. Fang, L. Xu*, H. Zhang, Y. Zhu* and W.-Y. Wong*, "Metalloporphyrin-Linked Mercurated Graphynes for Ultrastable CO2 Electroreduction to CO with Nearly 100% Selectivity at a Current Density of 1.2 A cm−2", J. Am. Chem. Soc., 2022, 144, 15143−15154. (Impact factor: 15; Citations: 15) https://doi.org/10.1021/jacs.2c05059

(7) G.-J. Zhou, W.-Y. Wong*, B. Yao, Z.-Y. Xie* and L.-X. Wang, "Triphenylamine-Dendronized Pure Red Iridium Phosphors with Superior OLED Efficiency/Color Purity Trade-offs", Angew. Chem. Int. Ed., 2007, 46, 1149-1151. (Impact factor: 16.6; Citations: 342) https://doi.org/10.1002/anie.200604094

(8) G.-J. Zhou, C.-L. Ho, W.-Y. Wong*, Q. Wang, D. Ma*, L.-X. Wang, Z.-Y. Lin, T. B. Marder* and A. Beeby, "Manipulating Charge-Transfer Character with Electron-Withdrawing Main-Group Moieties for the Color Tuning of Iridium Electrophosphors", Adv. Funct. Mater., 2008, 18, 499-511. (Impact factor: 19; Citations: 473) https://doi.org/10.1002/adfm.200700719

(9) H.-B. Wu*, G.-J. Zhou*, J.-H. Zou, C.-L. Ho, W.-Y. Wong*, W. Yang, J.-B. Peng and Y. Cao, "Efficient Polymer White-Light-Emitting Devices for Solid-State Lighting", Adv. Mater., 2009, 21, 4181-4184. (Impact factor: 29.4; Citations: 307) https://doi.org/10.1002/adma.200900638

(10) B. Zhang, G. Tan, C.-S. Lam, B. Yao, C.-L. Ho, L. Liu, Z. Xie* and W.-Y. Wong*, J. Ding and L. Wang*, "High-Efficiency Single Emissive Layer White Organic Light-Emitting Diodes Based on Solution-Processed Dendritic Host and New Orange-Emitting Iridium Complex", Adv. Mater., 2012, 24, 1873-1877. (Impact factor: 29.4; Citations: 343) https://doi.org/10.1002/adma.201104758