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The Research Grants Council of Hong Kong
NSFC/RGC Joint Research Scheme
Joint Completion Report

(Please attach a copy of the completion report submitted to the NSFC by the Mainland researcher)

Part A: The Project and Investigator(s)

1. Project Title

Fluorescent Organic Compound–Phosphorescent Inorganic Transition Metal Complex Conjugates as Bioprobes and Imaging Reagents
熒光有機化合物和磷光無機過渡金屬配合物的結合物作為生物探針和成像試劑

2. Investigator(s) and Academic Department/Units Involved

	Hong Kong Team	Mainland Team
Name of Principal Investigator *(with title)*	Prof. Kenneth Kam-wing LO	Prof. Cong YU
Post	Professor	Professor
Unit / Department / Institution	Department of Chemistry, City University of Hong Kong	Changchun Institute of Applied Chemistry, Chinese Academy of Sciences
Contact Information	E-mail: bhkenlo@cityu.edu.hk Tel: (852) 3442 7231	E-mail: congyu@ciac.ac.cn Tel: (86) 431-85262710
Co-investigator(s) *(with title and institution)*	-	-

3. Project Duration

	Original	Revised	Date of RGC/ Institution Approval *(must be quoted*)
Project Start date	01-Jan-2016	-	01-Jan-2016
Project Completion date	31-Dec-2019	-	31-Dec-2019
Duration *(in month)*	48	-	48
Deadline for Submission of Completion Report	31-Dec-2020	-	31-Dec-2020

Part B: The Completion Report

5. Project Objectives

5.1 Objectives as per original application

1. To design, synthesize, and characterize conjugates of fluorescent perylene and phosphorescent transition metal complexes as new molecular probes.
2. To study the interactions of perylene and transition metal complexes within the conjugates to enhance their applicability as fluorescent or phosphorescent molecular probes.
3. To examine the biomolecule-binding properties of the conjugates and develop sensitive, selective, and efficient bioassays.

4. To investigate the cellular uptake, intracellular distribution, and bioimaging applications of the conjugates.

5.2 Revised Objectives

Date of approval from the RGC: N.A.

Reasons for the change: N.A.

6. Research Outcome

Major findings and research outcome
(maximum 1 page; please make reference to Part C where necessary)

Luminescent rhenium(I) polypyridine complexes containing a benzo[*ghi*]perylene unit [Re(N^N)$(CO)_3$(py-BP)](CF_3SO_3) (py-BP = pyridine–benzo[*ghi*]perylene; N^N = biq (**1**), Ph_2-phen (**2**), Me_4-phen (**3**)) and a perylenediimide moiety through a disulfide linker [Re(Ph_2-phen)$(CO)_3$(py-SS-PDI-TEG)](CF_3SO_3) (**4**) were synthesized and characterized. Upon photoexcitation, the complexes exhibited short-lived greenish-yellow fluorescence. Complex **4** was found to exhibit FRET from the rhenium(I) polypyridine to the perylene moiety, resulting in very weak emission from the inorganic unit and predominant fluorescence from the perylene moiety. The emission spectra of complex **4** showed substantial changes in the presence of glutathione (GSH), attributed to the disulfide cleavage of complex **4**. Specifically, the luminescence of the rhenium(I) polypyridine unit was recovered whereas the fluorescence of the perylene moiety disappeared due to π-π stacking. Live HeLa cells treated with the complex exhibited emission in the cytoplasm, and the intensity was substantially higher when the cells were treated with GSH, indicating that the complex can serve as an intracellular sensor for GSH. Related iridium(III) polypyridine complexes appended with a perylenediimide (PDI) unit through tri(ethylene)glycol (TEG) linker [Ir(N^C)$_2$(bpy-TEG-PDI-OEG)](PF_6) (HN^C = Hdfppy (**1a**), Hppy (**2a**), Hpqe (**3a**)) were isolated. Upon excitation, the PDI complexes showed intense PDI-based fluorescence, whereas the phosphorescence of the iridium(III) polypyridines was quenched by the PDI unit via FRET. Although the PDI complexes displayed lower cellular uptake efficiencies than their PDI-free counterparts due to aggregation, the phosphorescence of complex **3a** in aqueous media allowed it to serve as a bioimaging reagent. Importantly, excitation resulted in a very long-lived ^{3}PDI excited state (54.7 – 61.8 μs), endowing the complexes with strong $^1O_2$-photosensitizing ability and excellent photocytotoxic activity.

The interesting results generated from this work have been extended to other systems composed of various inorganic materials/complexes and organic components with rich photophysical and photochemical properties. For inorganic materials, the fluorescence turn-on detection of alkaline phosphatase (ALP) was realized by using poly(ethyleneimine)-capped copper nanoclusters as the fluorescent unit and MnO_2 nanosheets as fluorescence quencher. A

sensitive detection method for choline based on the *in situ* polymerization of aniline on the surface of upconverting nanoparticles was also developed. Additionally, an efficient method for the synthesis of silver nanoclusters capped silica nanoparticles (SiO_2@AgNCs) was established for the development of ratiometric luminescent nanosensor for I^- and S^{2-} ions. For inorganic metal complexes, photoactivatable iridium(III) PEG complexes with a nitrobenzyl group were designed; the nitrobenzyl unit allowed the complexes to be photoactivated, leading to the release of the PEG or TEG pendant and hence a significant increase in the cytotoxic activity, rendering the complexes to exhibit oxygen-independent photocytotoxicity. Ruthenium(II) *N*-methyl nitrone complexes were also developed; these complexes displayed phosphorogenic responses toward strained alkynes such as BCN-OH. Through structural modification, the complexes achieved specific cell membrane or cytosol staining in live cells. Iridium(III) complexes containing a chlorotetrazine pendant were synthesized; these complexes were non-emissive due to effective FRET and PET from the excited iridium(III) unit to the organic tetrazine moiety. However, they exhibited significant emission enhancement upon reacting with BCN-OH (*ca*. 19.5 to 121.9 fold) and the conjugate BCN-BSA (*ca*. 140.8 to 1133.7 fold). Monochromophoric tetrazine probes composed of an iridium(III) center with a built-in tetrazine derivative were established; the phosphorogenic properties of the complexes allowed them to be used to label BCN-BSA with an emission enhancement factor up to 1372 fold. In another study, iridium(III) complexes containing an organic 2,4-dinitrophenyl ether moiety were designed; these complexes were non-emissive due to the efficient quenching effect of the dinitroaromatic moiety. However, upon the reaction with GSH or H_2S, the emission was turned on due to the departure of the quenching unit. Iridium(III) complexes appended with a phenylboronic acid unit were also synthesized; the sialic acid-binding, cellular uptake, cytotoxicity, and bioimaging capability of the complexes were investigated. Two ruthenium(II) fructose complexes were designed; one of the complexes displayed intense membrane staining toward MCF-7 cells but was localized in the mitochondria of HeLa cells. Furthermore, iridium(III) and rhenium(I) complexes containing an organic sydnone moiety were synthesized; these complexes displayed significant emission enhancement upon reaction with strained alkyne derivatives, and were utilized to label cyclooctyne-modified proteins and ceramide or morpholine in live cells.

Potential for further development of the research and the proposed course of action *(maximum half a page)*

We have demonstrated in this collaborative project that the modification of phosphorescent transition metal complexes with a fluorescent organic moiety allows the production of novel conjugate that exhibit interesting photophysical and photochemical properties. These new behavior can be exploited in the development of new bioassays, luminescent sensors of small molecules, bioimaging agents for molecular markers and organelles in live cells, and controllable photocytotoxic agents. The most important finding is that the properties of the conjugates are not simply addition of those of the two individual components because in all the cases, emission quenching due to FRET and PET can occur, aggregation behavior of the inorganic and organic units can also be finely controlled. On the basis of these interesting results, we believe that this project can be further developed. Since we have demonstrated that the photophysical, photochemical, cellular uptake, intracellular localization, and (photo)cytotoxic properties of inorganic and organometallic transition metal complexes and organic aromatics can be strategically enriched through structural modifications, we believe that the use of other phosphorescent transition metal complexes, fluorescent organic units, and various spacer arms with or without π-conjugation will lead to the development of highly sensitive bioassays, imaging reagents, and photocytotoxic agents.

7. The Layman's Summary

(describe in layman's language the nature, significance and value of the research project, in no more than 200 words)

In this project, new conjugates composed of phosphorescent transition metal complexes and fluorescent perylene and related organic derivatives have been designed, synthesized, and characterized. The photophysical, photochemical, and biological properties of the conjugates have also been investigated. Despite the fact that transition metal perylene complexes had previously been reported, the utilization of these complexes in bioanalytical sensing had not been examined. Additionally, their potential as imaging reagents for live cells had not been explored. Thus, we have targeted to investigate whether the coupling of transition metal complexes of different nature would affect the aggregation behavior of perylene derivatives; whether the photophysical properties of the metal complexes and perylene would be affected after conjugation; and whether the cellular uptake and cytotoxicity of the two units would be changed. We have demonstrated that the environment-sensitive phosphorescence of transition metal complexes and the aggregation-dependent fluorescence of perylene can enable the inorganic/organic hybrids to display interesting quenching characteristic that is absent in the metal complex and organic fluorophore alone, which can be exploited for biological sensing and organelle-targeting in bioimaging applications. The interesting results generated from this project will expand the bioanalytical toolbox and contribute to the development of new diagnostic and therapeutic reagents.

Part C: Research Output

8. Peer-reviewed journal publication(s) arising directly from this research project

(Please attach a copy of each publication and/or the letter of acceptance if not yet submitted in the previous progress report(s). All listed publications must acknowledge RGC's funding support by quoting the specific grant reference.)

The Latest Status of Publications				Author(s) ***(bold** the authors belonging to the project teams and denote the corresponding author with an asterisk*)*	Title and Journal/ Book *(with the volume, pages and other necessary publishing details specified)*	Submitted to RGC *(indicate the year ending of the relevant progress report)*	Attached to this report *(Yes or No)*	Acknowledged the support of this Joint Research Scheme *(Yes or No)*	Accessible from the institutional repository *(Yes or No)*
Year of publication	Year of Acceptance *(For paper accepted but not yet published)*	Under Review	Under Preparation *(optional)*						
2017				Zhang, Y.; Li, Y.; Zhang, C.; Zhang, Q.; Huang, X.; Yang, M.; Shahzad, S. A.; **Lo, K. K.-W.;* Yu, C.;*** Jiang, S.*	Fluorescence Turn-on Detection of Alkaline Phosphatase Activity Based on Controlled Release of PEI-capped Cu Nanoclusters from MnO_2 Nanosheets. *Analytical and Bioanalytical Chemistry* **2017**, *409*, 4771 – 4778.	2017	No	Yes	Yes

2017				Huang, X.; Shahzad, S. A.; Li, Y.; Zhang, Y.; Zhou, H.; Jiang, H.; **Lo, K. K.-W.;* Yu, C.***	Silver nanoclusters capped silica nanoparticles as a ratiometric photoluminescence nanosensor for the selective detection of I^- and S^{2-}. *Analytica Chimica Acta* **2017**, *988*, 74 – 80.	2017	No	Yes	Yes
2017				Li, Y.; Yin, S.; Lu, Y.; Zhou, H.; Jiang, H.; Niu, N.; Huang, H.; Zhang, L.; **Lo, K. K.-W.;* Yu, C.***	Choline Sensing Based on In Situ Polymerization of Aniline on the Surface of Upconverting Nanoparticles. *Journal of Materials Chemistry B* **2017**, *5*, 7861 – 7865.	2017	No	Yes	Yes
2016				Tso, K. K.-S.; Leung, K.-K.; Liu, H.-W.; **Lo, K. K.-W.***	Photoactivatable Cytotoxic Agents Derived from Mitochondria- targeting Luminescent Iridium(III) Poly(ethylene glycol) Complexes Modified with a Nitrobenzyl Linkage. *Chemical Communications* **2016**, *52*, 4557 – 4560.	2017	No	Yes	Yes
2016				Tang, T. S.-M., Liu, H.-W.; **Lo, K. K.-W.***	Structural Manipulation of Ruthenium(II) Polypyridine Nitrone Complexes to Generate Phosphorogenic Bioorthogonal Reagents for Selective Cellular Labeling. *Chemistry – A European Journal* **2016**, *22*, 9649 – 9659.	2017	No	Yes	Yes
2016				Li, S. P.-Y.; Yip, A. M.-H.; Liu, H.-W.; **Lo, K. K.-W.***	Installing an Additional Emission Quenching Pathway in the Design of Iridium(III)-based Phosphorogenic Biomaterials for Bioorthogonal Labeling and Imaging. *Biomaterials* **2016**, *103*, 305 – 313.	2017	No	Yes	Yes
2017				Tang, T. S.-M., Liu, H.-W.; **Lo, K. K.-W.***	Monochromophoric Iridium(III) Pyridyl-tetrazine Complexes as a Unique Design Strategy for Bioorthogonal Probes with Luminogenic Behavior. *Chemical Communications* **2017**, *53*, 3299 – 3302.	2017	No	Yes	Yes
2017				Liu, H.-W.; Law, W. H.-T.; Lee, L. C.-C.; Lau, J. C.-W.; **Lo, K. K.-W.***	Cyclometalated Iridium(III) Bipyridine-Phenylboronic Acid Complexes as Luminescent Probes for Sialic Acids and Bioimaging Reagents. *Chemistry – An Asian Journal* **2017**, *12*, 1545 – 1556.	2017	No	Yes	Yes

2017				Tso, K. K.-S.; Liu, H.-W.; **Lo, K. K.-W.***	Phosphorogenic Sensors for Biothiols Derived from Cyclometalated Iridium(III) Polypyridine Complexes Containing a Dinitrophenyl Ether Moiety. *Journal of Inorganic Biochemistry* **2017**, *177*, 412 – 422.	2017	No	Yes	Yes
2017				Lau, C. T.-S.; Chan, C.; Zhang, K. Y.; Roy, V. A. L.; **Lo, K. K.-W.***	Photophysical, Cellular Uptake, and Bioimaging Studies of Luminescent Ruthenium(II) Polypyridine Complexes Containing a D-Fructose Pendant. *European Journal of Inorganic Chemistry* **2017**, 5288 – 5294.	2017	No	Yes	Yes
2017				Lee, L. C.-C.; Leung, K.-K.; **Lo, K. K.-W.***	Recent Development of Luminescent Rhenium(I) Tricarbonyl Polypyridine Complexes as Cellular Imaging Reagents, Anticancer Drugs, and Antibacterial Agents. *Dalton Transactions* **2017**, *46*, 16357 – 16380.	2017	No	Yes	Yes
2018				Yip, A. M.-H.; **Lo, K. K.-W.***	Luminescent Rhenium(I), Ruthenium(II), and Iridium(III) Polypyridine Complexes Containing a Poly(ethylene glycol) Pendant or Bioorthogonal Reaction Group as Biological Probes and Photocytotoxic Agents. *Coordination Chemistry Reviews* **2018**, *361*, 138 – 163	No	Yes	Yes	Yes
2018				Lee, L. C.-C.; Cheung, H. M.-H.; Liu, H.-W.; **Lo, K. K.-W.***	Exploitation of Environment-sensitive Luminophores in the Design of Novel Sydnone-based Bioorthogonal Imaging Reagents. *Chemistry – A European Journal* **2018**, *24*, 14064 – 14068	No	Yes	Yes	Yes
2019				Yip, A. M.-H.; Shum, J.; Liu, H.-W.; Zhou, H.; Jia, M.; Niu, N.; Li, Y.; **Yu, C.;*** **Lo, K. K.-W.***	Luminescent Rhenium(I) Polypyridine Complexes Appended with a Perylene Diimide or Benzoperylene Monoimide Moiety: Photophysics, Intracellular Sensing, and Photocytotoxic Activity. *Chemistry – A European Journal* **2019**, *25*, 8970 – 8974	No	Yes	Yes	Yes

2019				Shum, J.; Leung, P. K.-K.; **Lo, K. K.-W.***	Luminescent Ruthenium(II) Polypyridine Complexes for a Wide Variety of Biomolecular and Cellular Applications. *Inorganic Chemistry* **2019**, *58*, 2231 – 2247	No	Yes	Yes	Yes
2019				Li, S. P.-Y.; Yim, V. M.-W.; Shum, J.; **Lo, K. K.-W.***	Iridium(III) Polypyridine Complexes with a Disulfide Linker as Biological Sensors and Cytotoxic Agents. *Dalton Transactions* **2019**, *48*, 9692 – 9702	No	Yes	Yes	Yes
2019				Zhu, J.-H.; Tang, B. Z.;* **Lo, K. K.-W.***	Luminescent Molecular Octopuses with a Polyhedral Oligomeric Silsesquioxane Core and Iridium(III) Polypyridine Arms: Synthesis, Aggregation Induced Emission, Cellular Uptake and Bioimaging Studies. *Chemistry – A European Journal* **2019**, *25*, 10633 – 10641	No	Yes	Yes	Yes
2020				**Lo, K. K.-W.***	Molecular Design of Bioorthogonal Probes and Imaging Reagents Derived from Photofunctional Transition Metal Complexes. *Accounts of Chemical Research* **2020**, *53*, 32 – 44.	No	Yes	Yes	Yes
2020				Shum, J.; Zhang, P.-Z.; Lee, L. C.-C.; **Lo, K. K.-W.***	Bioorthogonal Phosphorogenic Rhenium(I) Polypyridine Sydnone Complexes for Specific Lysosome Labeling. *ChemPlusChem* **2020**, in press.	No	Yes	Yes	Yes
			2020	Tso, K. K.-S.; Liu, H.-W.; Zhou, H.; Jia, M.; Niu, N.; Li, Y.; **Yu, C.;* Lo, K. K.-W.***	Cyclometalated Iridium(III) Complexes Appended with a Perylene Diimide Unit as Efficient Singlet Oxygen-Photosensitizers and Photocytotoxic Agents. (Under preparation)	No	Yes	Yes	No

9. Recognized international conference(s) in which paper(s) related to this research project was/were delivered

(Please attach a copy of each delivered paper. All listed papers must acknowledge RGC's funding support by quoting the specific grant reference.)

Month/Year/Place	Title	Conference Name	Submitted to RGC *(indicate the year ending of the relevant progress report)*	Attached to this report *(Yes or No)*	Acknowledged the support of this Joint Research Scheme *(Yes or No)*	Accessible from the institutional repository *(Yes or No)*

Jul/2016/ Brest	Luminescent Rhenium(I), Ruthenium(II), and Iridium(III) Complexes as Intracellular Sensors, Cytotoxic Agents, and Bioorthogonal Probes	The 42nd International Conference on Coordination Chemistry (ICCC-42)	2017	No	No	No
Oct/2016/ Shanghai	Utilization of Rhenium(I), Ruthenium(II), and Iridium(III) Complexes as Intracellular Sensors, Cytotoxic Agents, and Bioorthogonal Probes	The 13th Conference on Bioinorganic Chemistry in China	2017	No	No	No
Dec/2016/ Singapore	Development of Photofunctional Rhenium(I), Ruthenium(II), and Iridium(III) Complexes as Intracellular Sensors, Cytotoxic Agents, and Bioorthogonal Probes	The 9th Asian Photochemistry Conference (APC), Singapore	2017	No	Yes	No
Dec/2016/ Auckland	Intracellular Sensors, Cytotoxic Agents, and Bioorthogonal Probes Derived from Photoactive Rhenium(I), Ruthenium(II), and Iridium(III) Polypyridine Complexes	The 8th Asian Biological Inorganic Chemistry Conference (AsBIC8)	2017	No	No	No
Jul/2017/ Oxford	Photoactivatable Cytotoxic Agents and Bioorthogonal Probes Derived from Rhenium(I), Ruthenium(II), and Iridium(III) Complexes	The 22nd International Symposium on the Photophysics and Photochemistry of Coordination Compounds (ISPPCC)	2017	No	No	No

Jul/2017/ Melbourne	Luminescent Rhenium(I), Ruthenium(II), and Iridium(III) Complexes as Novel Cellular Reagents	Fluorescence Symposium of the Royal Australian Chemical Institute (RACI) National Centenary Conference	2017	No	No	No
Jul/2017/ Melbourne	Photofunctional Transition Metal Complexes as Intracellular Sensors and Bioorthogonal Probes	The 6th Asian Conference on Coordination Chemistry (ACCC-6)	2017	No	No	No
Jul/2018/ Sendai	Photofunctional Transition Metal Complexes as Intracellular Sensors, Cytotoxic Agents, and Bioorthogonal Probes	The 43rd International Conference on Coordination Chemistry (ICCC 2018)	No	Yes	No	No
Aug/2018/ Birmingham	Photofunctional Rhenium(I), Ruthenium(II), and Iridium(III) Complexes as New Bioorthogonal Probes, Imaging Regents, and Photocytotoxic Agents	The 14th European Biological Inorganic Chemistry Conference (EuroBIC 14)	No	Yes	No	No
Dec/2018/ Singapore	Biomolecular Probes and Cellular Reagents Derived from Luminescent Rhenium(I), Ruthenium(II), and Iridium(III) Complexes	The 9th Asian Biological Inorganic Chemistry Conference (AsBIC9)	No	Yes	No	No
Dec/2018/ Taipei	Exploitation of Luminescent Transition Metal Polypyridine Complexes as Bioorthogonal Probes, Cellular Imaging Reagents, and Photocytotoxic Agents	The 10th Asian Photochemistry Conference (APC)	No	Yes	No	No

10. Student(s) trained *(Please attach a copy of the title page of the thesis.)*

Name	Degree registered for	Date of registration	Date of thesis submission/ graduation
Steve Po-Yam Li	PhD	1 Sep 2012	Sep 2016 (thesis title page attached)
Tommy Siu-Ming Tang	PhD	1 Sep 2012	Mar 2017 (thesis title page attached)
Karson Ka-Shun Tso	PhD	1 Sep 2013	Nov 2018 (thesis title page attached)
Lawrence Cho-Cheung Lee	PhD	1 Sep 2014	31 Aug 2020
Kam-Keung Leung	PhD	1 Sep 2015	31 Aug 2020
Alex Man-Hei Yip	PhD	1 Sep 2016	31 Aug 2020
Jing-Hui Zhu	PhD	1 Sep 2017	31 Aug 2020
Justin Shum	PhD	1 Sep 2019	31 Aug 2023

11. Other impact *(e.g. award of patents or prizes, collaboration with other research institutions, technology transfer, etc.)*

1. A patent application entitled "Luminogenic Transition Metal-Based Pyridyl Complex and its Use" has been submitted. US Patent Application No. 15/359,736, filed on 23 Nov 2016. Lo, Kenneth Kam-Wing; Liu, Hua-Wei; Lee, Cho-Cheung; Tang, Siu-Ming.

2. The Hong Kong PI has been elected to be a Vice Chair and Chair at the Gordon Research Conference – Metals in Medicine 2016 and 2018, respectively.

3. The publication entitled "Monochromophoric Iridium(III) Pyridyl-tetrazine Complexes as a Unique Design Strategy for Bioorthogonal Probes with Luminogenic Behavior" (*Chem. Commun.* **2017**, *53*, 3299 – 3302) was highlighted as a cover of issue 23 of the journal.

4. The publication entitled "Cyclometalated Iridium(III) Bipyridine–Phenylboronic Acid Complexes as Bioimaging Reagents and Luminescent Probes for Sialic Acids" (*Chem. Asian J.* **2017**, *12*, 1545 – 1556) was an invited article for inclusion in the special issue "Celebrating the 100th Anniversary of the Founding of the Royal Australian Chemical Institute (RACI)".

5. The publication entitled "Phosphorogenic sensors for biothiols derived from cyclometalated iridium(III) polypyridine complexes containing a dinitrophenyl ether moiety" (*J. Inorg. Biochem.* **2017**, *177*, 412 – 422) was an invited article for inclusion in the proceedings of the 8th Asian Biological Inorganic Chemistry Conference (AsBIC8).

6. The publication entitled "Photophysical, Cellular Uptake, and Bioimaging Studies of Luminescent Ruthenium(II) Polypyridine Complexes Containing a D-Fructose Pendant" (*Eur. J. Inorg. Chem.* **2017**, 5288 – 5294) was an invited article for

inclusion in the Cluster Issue entitled "Luminescent Materials Encompassing Metal Complexes, Clusters and Nanomaterials" of the journal.

7. The publication entitled "Recent Development of Luminescent Rhenium(I) Tricarbonyl Polypyridine Complexes as Cellular Imaging Reagents, Anticancer Drugs, and Antibacterial Agents" (*Dalton Trans*. **2017**, *46*, 16357 – 16380) was an invited article and published as a Perspective.

8. The publication entitled "Luminescent Rhenium(I), Ruthenium(II), and Iridium(III) Polypyridine Complexes Containing a Poly(ethylene glycol) Pendant or Bioorthogonal Reaction Group as Biological Probes and Photocytotoxic Agents" (*Coord. Chem. Rev.* **2018**, *361*, 138 – 163) was an invited article included in the Special Issue for the 22nd International Symposium on the Photophysics and Photochemistry of Coordination Compounds (ISPPCC), Oxford, UK (9 – 14 July 2017).

9. The publication entitled "Luminescent Ruthenium(II) Polypyridine Complexes for a Wide Variety of Biomolecular and Cellular Applications" (*Inorg. Chem.* **2019**, *58*, 2231 – 2247) was an invited article published as a Viewpoint article.

10. The publication entitled "Iridium(III) Polypyridine Complexes with a Disulfide Linker as Biological Sensors and Cytotoxic Agents" (*Dalton Trans*. **2019**, *48*, 9692 – 9702) was an invited article published under the theme "Diagnostics and Medical Applications" of the themed issue "d-Block Chemistry".

11. The publication entitled "Molecular Design of Bioorthogonal Probes and Imaging Reagents Derived from Photofunctional Transition Metal Complexes." (*Acc. Chem. Res.* **2020**, *53*, 32 – 44) was an invited article published included in the Special Issue entitled "Activity-Based Sensing".

12. The publication entitled "Bioorthogonal Phosphorogenic Rhenium(I) Polypyridine Sydnone Complexes for Specific Lysosome Labeling" (*ChemPlusChem* **2020**, in press) was an invited article published included in the Special Collection: entitled "Fluorescent Biomolecules and their Building Blocks".