

Ph.D. Candidate

**Barbora Balónová**

Graduate Academic Unit

**Chemistry**

~~~~~

**November 29, 2019**

**2:30 p.m.**

**F.J. Toole Hall  
Room 303**

~~~~~

**Examining Board:**

Dr. Sara Eisler (Chemistry)

Dr. Gilles Villemure (Chemistry)

Dr. René Malenfant (Biology)

Dr. Barry Blight (Chemistry)

Supervisor

**External Examiner:**

Dr. Stephen Loeb

Dept. of Chemistry and Biochemistry

University of Windsor

**The Oral Examination will be chaired by:**

Dr. Kevin Englehart, Associate Dean of Graduate Studies

**BIOGRAPHY**

**Universities attended (with dates & degrees obtained):**

2017 – present

PhD candidate, University of New Brunswick

2013 – 2015

MSc Chemistry, Slovak University of Technology, Bratislava, Slovakia

2010 – 2013

BSc Chemistry, Slovak University of Technology, Bratislava, Slovakia

**Journal Publications:**

7. S. J. Thomas, **B. Balónová**, J. Cinatl jr., M. N. Wass, C. J. Serpell, B. A. Blight, M. Michaelis, Thiourea and Guanidine Compounds and Iridium Complexes in Drug-Resistant Cancer Cell Lines: Structure Activity Relationships and Direct Luminescent Imaging, **2019**, *ChemRxiv*, Preprint posted online 11. 07. 2019, doi:10.26434/CHEMRXIV.8856146.V1.
6. H. M. Coubrough, **B. Balónová**, C. Pask, B. A. Blight, A.J. Wilson. A Switchable Triple Hydrogen-Bonding Motif, **2019** (Submitted)
5. **B. Balónová**, H. J. Shepherd, C. Serpell, B. Blight, Ir III as a Strategy for Preorganization in H-Bonded Motifs, *Supramolecular Chemistry*, **2019** doi:10.1080/10610278.2019.1649674
4. P. Šafář, Š. Marchalín, **B. Balónová**, M. Šoral, J. Moncol, A. Ghinet, B. Rigo, A. Dařich, Study on the Reactivity of Enantiopure (S)-6-Oxopiperic Acid and Corresponding Pyridisoquinolines under Acid Conditions. *European J. Org. Chem.* **2018**, 40, 5499–5511 doi:10.1002/ejoc.201800908.
3. T. Pagáč, P. Šafář, Š. Marchalín, Z. Ježíková, **B. Balónová**, M. Šupolíková, E. Nováková, J. Kubíčková, M. Šoral, J. Sivý, P. Olejníková, Asymmetric Synthesis and Study of Biological Activity of Epi-Benzoanalogues of Bioactive Phenanthroquinolizidine Alkaloids. *Monatshefte für Chemie - Chem. Mon.* **2018**, 149 (10), 1865–1876 doi: 10.1007/s00706-018-2244-5.
2. **B. Balónová**, D. Rota Martir, E. R. Clark, H. J. Shepherd, E. Zysman-Colman, B. A. Blight, Influencing the Optoelectronic Properties of a Heteroleptic Iridium Complex by Second-Sphere H-Bonding Interactions. *Inorg. Chem.* **2018**, 57 (14), 8581–8587 doi: 10.1021/acs.inorgchem.8b01326.
1. N. Löschmann, M. Michaelis, F. Rothweiler, Y. Voges, **B. Balónová**, B. A. Blight, J. Cinatl, ABCB1 as predominant resistance mechanism in cells with acquired SNS-032 resistance. *Oncotarget* **2016**, 7(36), 58051–58064. doi: 10.18632/oncotarget.11160

**Patents:**

1. Blight B., **Balónová B.**, “Metal Complexes and Methods of Preparing Same”:  
-US Provisional Patent Application No. US16/033,754 Filed on 12.07.2018  
-Canadian Patent Application No. CA3,011,129 Filed on 12.07.2018

**Several Conference Presentations, Awards and Grants**

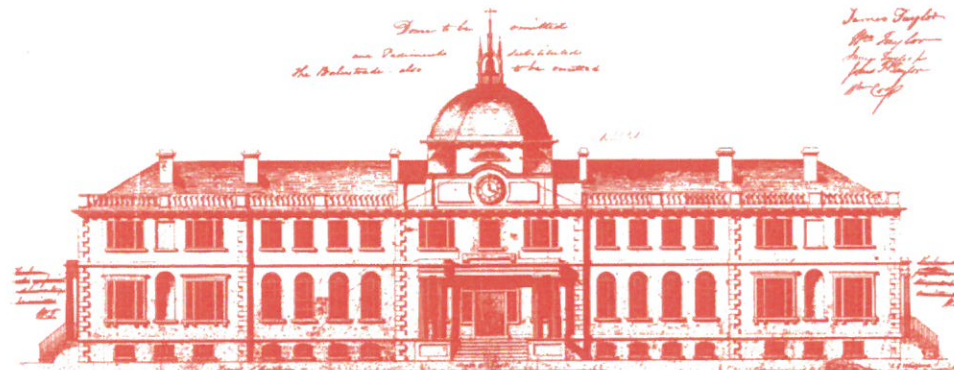
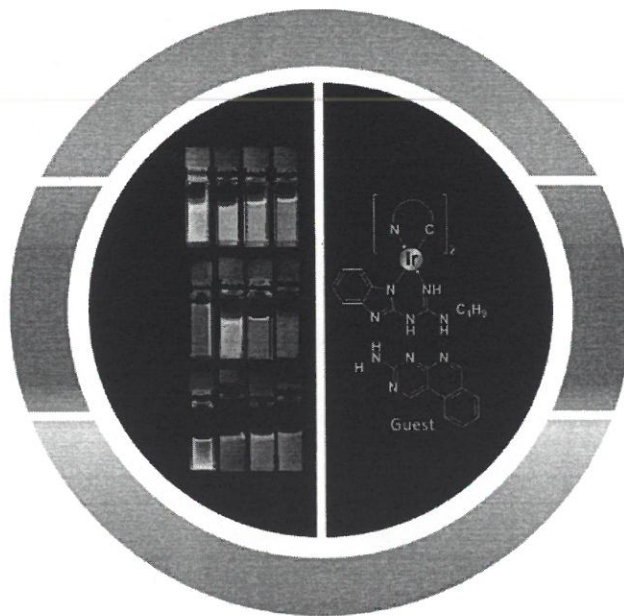
# Multipoint Hydrogen Bonding of Iridium (III) Complexes for Influencing Chromaticity

## Abstract

Iridium complexes (with various N<sup>+</sup>C ligands) are undergoing intensive investigation, due to their excellent performance when used as emitters in phosphorescent organic light emitting diodes (PhOLEDs). To fulfill the requirements of full-colour OLED displays, the colour regulation (towards blue, green and red emissions) is highly desirable. In this thesis, we explore the colour tuning of different iridium emitters by host-guest assembly with DNA base-pair-like interactions in super strong hydrogen bonded arrays.

Hydrogen bonds represent ideal interactions for holding supramolecular systems together, as they combine relatively strong intermolecular attractions with excellent reversibility. Our findings suggest that this methodology for colour tuning can negate the synthetic manipulation of the ligand structure around iridium, which is often costly and time consuming.

We analyzed the association strength of iridium complexes when combined with different hetero-*n*-acenes in supramolecular systems. The incorporation of iridium metal in the H-bonded motifs contributes to understanding of preorganized self-assemblies and opens new pathways in design of novel soft materials. Furthermore, we observe change in chromaticity of iridium complexes by simply varying the concentration of compliment-guest, while examining change in the emission properties. Presented work in this thesis focuses on supramolecular chemistry combined with strategic synthesis, which can lead to novel materials with dynamic properties.



*Home of the School of Graduate Studies, Sir Howard Douglas Hall was designed by J.E. Woolford in 1825 and is the oldest university building in Canada still in use.*

*The University of New Brunswick recognizes that the university sits on traditional Wolastoqey territory. The river that runs right by our university – the St. John River – is also known as Wolastoq, along which live the Wolastoqiyik -- the people of the beautiful and bountiful river.*

## UNIVERSITY OF NEW BRUNSWICK SCHOOL OF GRADUATE STUDIES

### ORAL EXAMINATION

### Barbora Balónová

### IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

### DOCTOR OF PHILOSOPHY