Ing. Kristýna Kolouchová
Born 9. 7. 1992 in Prague, Czech Republic
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Education

2016 - now **PhD. studies: Macromolecular chemistry**
Faculty of Science, Charles University in Prague
Thesis: Self-assembled polymer systems based on poly[(N- 2,2-difluorethyl) acrylamide] as theranostics for ^{19}F Magnetic Resonance Imaging
Estimated completion date: November 2020

2014 – 2016 **Master's studies: Organic Chemistry**
Faculty of Chemical Technology, University of Chemistry and Technology, Prague
Thesis: Synthesis of Fischer bis-carbene complexes

2011 – 2014 **Bachelor studies: Environmental chemistry**
Faculty of Science, Charles University in Prague
Thesis: Activity of hydrolytic enzymes in the process of production of biogass

Work Experience

2016 - now **Student researcher at the Department of Supramolecular Polymeric Systems. Institute of Macromolecular Chemistry Czech Academy of Sciences (CAS), Research group of Dr. Martin Hruby**
Synthesis and physico-chemical studies of supramolecular structures based on smart polymeric materials capable of self-assembly in aqueous solutions for medical applications. The research activity is mainly focused on the synthesis (living polymerization methods - RAFT, CROP, ATRP) of versatile types of polymers (polyacrylamides/acrylates, polymethacrylates/methacrylamides, polyoxazolines), standard polymerizations (polycondensation, radical polymerization), their physico-chemical characterization by experimental techniques (dynamic/static light scattering, gel permeation chromatography, NMR spectroscopy, turbidimetry, critical association concentration, drug loading/release, etc.) and cooperation with advanced experimental techniques (MRI, small neutron/x-ray light scattering) and biological studies (cytotoxicity, cell uptake, in vivo pharmacokinetics).

2014 – 2016 Student researcher at the Department of Organic Chemistry, University of Chemistry and Technology, Prague (Master thesis), Research group of Prof. Ing. Dalimil Dvorak, Csc.
Synthesis of Fisher carbene complexes using organometallic reactions and basic sythetic methods, their characterization and physico-chemical properties.

1.8.2015 – 31.8.2015 Student researcher at the Institute of Organic Chemistry and Biochemistry CAS, Laboratory of Organic Synthesis, Chemistry of Functional Molecules Research Group of Ing. Ivo Starý, PhD.
Total synthesis of helicene.

2014 Student researcher at the Institute of animal physiology and genetics CAS (Bachelor thesis)

Experimental determination of enzymatic activity during all stages of the biogass production, in order to determine the effective biogass collection and enhance its production.

International working experience

1.5.2019 - 31.7.2019 Internship at the Institute of Chemistry, Department of Polymer Chemistry, Potsdam University, Research Group of Prof. Dr. Helmut Schlaad
Synthesis of versatile polymer architectures containing porphyrin derivatives for biomedicinal applications and physico-chemical investigation of their assemblies. First, a group of the porphyrine derivatives was prepared by cationic ring-opening polymerization of methyloxazoline modified with protoporphyrine derivatives prepared in ABA, AB and ABABAB block architectures, in order to determine an ideal polymeric photosenzitizer for phototherapeutic applications. A second group of phorphyrine derivatives was prepared by RAFT polymerization of polyacrylamide monomers. The resulting polymers can be used as paramagnetic relaxation-based ^{19}F MRI tracer for the detection of protease activity. Publications in progress.

17.11.2018 – 30.11.2018 Internship at the Department of Organic Chemistry, Tel Aviv University, Israel, Research Group of Dr. Roey J. Amir
Study of stability in biological media of previously prepared and labelled self-assembled thermoresponsive polymeric ^{19}F MRI nanosized tracers in biological media using a coumarine FRET system. Publication in progress.

27.11.2017 – 10.12.2017 Internship at the Department of Organic and Macromolecular Chemistry, Ghent University, Belgium, Research Group of Prof. Dr. Richard Hoogenboom
Synthesis of a wide range of gradient and block amphiphilic copolymers (poly(2-oxazoline) derivatives) to assess the inner structure of nanoprecipitated particles in water, compare their stability and find the optimal polymer for drug formulation purposes. Polymer assemblies in aqueous solutions were determined using several light scattering methods (DLS, SANS, SAXS) and their stability, drug loading capacity, biocompatibility was determined using several in vitro methods.

Conferences and Trainings

3.2.-6.2.2020	Kolokvia 2020, Institute of Macromolecular Chemistry CAS (presentation)
31.3.-4.4.2019	ACS national meeting, Orlando, Florida (presentation)
11.9.-15.9.2019	Czechoslovakian Conference, 71. Zjazd chemikov, Tatry, Slovakia (presentation)
7.10.-11.10.2019	SANS meassurements, Saclay Nuclear Reasearch Centre, France
2.12.-5.12.2018	SANS meassurements, ISIS Neutron and Muon Source, Didcot, UK
2.10.-5.10.2018	Czechoslovakian Conference, Polymery, Třešť (presentation)
28.5.-31.5.2018	International Conference, Bordeaux Polymer Conference, France (poster)
11.9-15.9.2017	Czechoslovakian Conference, 69. Zjazd chemikov, Tatry, Slovakia (poster)
14.5-19.5.2017	EPF 8th Summer school, Transport Phenomena in Polymers and Hybrid Materials, Gargnano, Italy (presentation)

1.4.2016 Student scientific conference at University of Chemistry and Technology, Prague (presentation)

Teaching/supervising activities

2017-2018 Bachelor thesis advisor: *Chelating polymers for hemachromatosis treatment*

Skills

Analytical methods - HPLC, GPC/SEC, NMR Spectroscopy, UV-vis spectroscopy, Fluorescence methods, Dynamic Light Scattering, Static Light Scattering, Small Angle Neutron Scattering, confocal microscopy, basic biological tests (cytotoxicity, cell-uptake), magnetic resonance spectroscopy and imaging (MRS and MRI)
Software - Origin, MestReNova, Chemdraw, ASTRA, Zetasizer Nano

Outreach activities

12.11-13.11.2019 Open doors at the Institute of Macromolecular Chemistry – part of the Week of Science and Technology (presentation on polymeric tracers and theranostics)

17.–22. 6. 2018 Representation at the Czech Academic Games (gold medal, beach volleyball)

18.–23. 6. 2017 Representation at the Czech Academic Games (gold medal, beach volleyball)

8.6-10.6.2017 Science Fair - Czech Academy of Science educational event

Languages

English: C1, French: B2

Publications

Kolouchova, K.; Sedlacek, O.; Jirak, D.; Babuka, D.; Blahut, J.; Kotek, J.; Vit, M.; Trousil, J.; Konefal, R.; Janouskova O.; Podhorska, B.; Slouf, M.; Hruby, M. Self-Assembled Thermoresponsive Polymeric Nanogels for ^{19}F MR Imaging. *Biomacromolecules* **2018**, *19*, 3515-3524.

D. Jirak, A. Galisova, **K. Kolouchova**, D. Babuka, M. Hruby, Fluorine polymer probes for magnetic resonance imaging: quo vadis? *Magnetic Resonance Materials in Physics, Biology and Medicine* **2019**, *32*, 173-185.

D. Babuka, **K. Kolouchova,** M. Hruby, O. Groborz, Z. Tosner, A. Zhigunov, P. Stepanek, Investigation of the internal structure of thermoresponsive diblock poly(2-methyl-2-oxazoline)-b-poly[N-(2,2-difluoroethyl)acrylamide] copolymer nanoparticles, *European Polymer Journal* **2019**, *121*, 109306.

Kolouchova, K.; Jirak, D.; Groborz, O.; Sedlacek, O.; Ziolkowska, N.; Vit, M.; Sticova, E.; Galisova, A.; Svec, P.; Trousil, J.; Hajek, M.; Hruby, M. Implant-forming polymeric ^{19}F MRI-tracer with tunable dissolution, *Journal of Controlled Release,* **2020**, *327*, 50-60.

Groborz, O.; Poláková, L.; **Kolouchová, K**.; Švec, P.; Loukotová, L.; Madhav Miriyala, V.; Francová, P.; Kučka, J.; Krijt, J.; Pára, P.; Báječný, M.; Heizer, T.; Pohl, R.; Czernek, J.; Šefc, L.; Beneš, J.; Štěpánek, P.; Hobza, P.; Hrubý, M. Chelating Polymers for Hereditary Haemochromatosis Treatment, accepted (28.8.2020) in *Macromolecular Bioscience* (Journal cover)

Submitted Publications:

Švec, P.; Nový, Z.; Kučka, J.; Petřík, M.; Sedláček, O.; Kuchař, M.; Lišková, B.; Medvedíková, M.; **Kolouchová, K.;** Groborz, O.; Loukotová, L.; Konefał, R.; Hajdúch, M.; Hrubý, M. Radioiodinated choline transport-targeted diagnostics, submitted to Journal of Medicinal Chemistry (24.1.2020)

Kolouchova, K.; Groborz, O.; Černochová, Z.; Gandalovicova, A.; Svec, P.; Slouf, M.; Hruby, M. Thermo- and ROS-Responsive Self-Assembled Polymer Nanoparticle Tracers for ^{19}F MRI Theranostic, submitted to Biomacromolecules (9.9.2020)

Grants

Charles University Grant Agency (GAUK) project (No. 602119), Self-assembled polymer nanosystems as theranostics for non-invasive fluorine magnetic resonance imaging (^{19}F MRI), 2 years project, principal researcher.

Charles University Grant Agency (GAUK) project (No. 766119), Polymer systems bearing fluorinated ferrocene moieties as complex theranostics with active targeting by novel choline derivatives, 2 years project, co-researcher.