

Introduction to the Carbohydrate Structure of Polysaccharides

August 9-10, 2021

Course Overview:

This 2-day virtual course will provide series of lectures and demonstrations, which cover the theory and techniques of isolation, purification and structure characterization of poly-, oligo-saccharides and glyco-conjugates. The lectures include “*Structural Characterization of Carbohydrate*”, and “*Isolation and Characterization of Bacterial Surface Polysaccharide*”, “*Xyloglucan Structure and Biosynthesis*”. The demonstrations, especially, will deliver detailed techniques and data interpretation for composition and linkage analyses of monosaccharide residues in poly-, oligo-saccharides and glyco-conjugates.

Takeaways:

- Gain an introduction to isolation and structure characterization of poly-, oligo-saccharides and glyco-conjugates.
- Learn various techniques for the analyses of carbohydrates

Preparation:

- We will provide a link to the platform on the day of the class
- This class requires a computer and strong internet connection
- Participants should be familiar with basic fundamentals of chemistry and biochemistry.

Instructors:



Dr. Parastoo Azadi - Dr. Parastoo Azadi received her B.Sc. in Chemistry in 1987 from University of North London, UK and her Ph.D. degree in biochemistry in 1991 from Imperial College of Science and Technology, University of London, studying structural characterization of carbohydrates and glycoproteins by mass spectrometry under the supervision of Profs. A. Dell and H.R. Morris. Since 2001, Dr. Parastoo Azadi has been the Technical Director of Analytical Service and Training at the Complex Carbohydrate Research Center. The samples submitted for these types of analyses come from academic, government, non-profit organizations and private companies, throughout the United States and internationally.



Dr. Artur Muszyński - Dr. Artur Muszyński received his Ph.D. degree in Biology in 2004 from the University of Silesia, Poland. He has more than 20 years of study focusing on the microbial glycobiology of bacterial pathogens including isolation and structural analysis.



Dr. Geert-Jan Boons - Dr. Boons received his M.Sc. in Chemistry in 1987 and his Ph.D. in Synthetic Carbohydrate Chemistry in 1991 from the State University of Leiden in The Netherlands. Prior to joining the faculty at the CCRC in 1998, he spent seven years in the United Kingdom, first as a postdoctoral fellow at Imperial College, London, and the University of Cambridge, and then as a lecturer and professor at the University of Birmingham. In addition to multiple awards for his career and research, he has published more than 250 articles. His research program emphasizes the chemical synthesis and biological functions of complex carbohydrates and glycoconjugates.



Dr. Debra Mohnen- Dr. Debra Mohnen received her B.A. in biology from Lawrence University (Wisconsin) and her M.S. in botany and Ph.D. in plant biology from the University of Illinois with Ph.D. research conducted largely at the Friedrich Miescher Institute in Basel, Switzerland. She was appointed to the CCRC faculty in September 1990 and is currently Professor in the Department of Biochemistry and Molecular Biology, adjunct faculty member in the Department of Plant Biology, and member of the Plant Center at UGA. Dr. Mohnen established and continues to direct "CarboSource Services" which provides rare substrates for plant wall polysaccharide synthesis to the research community.



Dr. Breeanna Urbanowicz - Dr. Urbanowicz received her B.S. in Biology in 2001 from Purdue University and her Ph.D. in 2008 from Cornell University. Prior to her junior faculty position at the Complex Carbohydrate Research Center, Dr. Urbanowicz was a Postdoctoral Fellow (2008-2013) in the Department of Biochemistry and Molecular Biology at the University of Georgia. She now serves as an Assistant Professor at the CCRC whose work focuses on understanding the integral steps in the molecular pathways used by plants to synthesize complex polysaccharides.



Dr. Michael Hahn - Dr. Hahn received a B.S. in chemistry and a B.A. in Independent Studies in 1974 from the University of Oregon and his Ph.D. in biochemistry in 1981 from the University of Colorado. A postdoctoral research associate appointment at the University of Wisconsin-Madison in plant pathology followed, after which Dr. Hahn went to the Albert-Ludwigs-Universität (Freiburg, Germany) with the support of an Alexander-von-Humboldt stipend. Following another postdoctoral research associate appointment at the Salk Institute (San Diego, CA), Dr. Hahn joined the CCRC in July 1986.



Dr. Stephanie Archer-Hartmann – Dr. Stephanie Archer-Hartmann received her B.Sc. in Chemistry in 2006 and her Ph.D in Analytical Chemistry in 2012 from West Virginia University. She has spent more than 10 years working towards improvements for the analysis of carbohydrates, including the isolation, preparation, and analysis of glycosaminoglycans

August 9-10, 2021

Monday, August 9, 2021

8:45 a.m. - 9:00 a.m.

Introduction and Welcome

Dr. Parastoo Azadi

9:15 a.m. – 10:45 a.m.

Lecture – *“Structural Characterization of Carbohydrates”*

----covers various methods for composition and linkage analysis of monosaccharide residues of polysaccharides, oligosaccharides and glycol-conjugates

Dr. Parastoo Azadi

11:00 a.m. – 12:00 a.m.

Lecture – *“Isolation and Characterization of Bacterial Surface Polysaccharides”*

Dr. Artur Muszynski

12:00 p.m. – 1:00 p.m. – Lunch

1:30 p.m. – 3:00 p.m.

Lecture – *“Different Forms of D-Glucose”*

Dr. Geert-Jan Boons

3:15 a.m. – 5:00 p.m.

Lab demo and data analysis of composition by TMS and AA

Dr. Artur Muszynski/Ian Black

Tuesday, August 10, 2021

9:00 a.m. – 10:00 a.m.

Lecture – *“A developing hypothesis: GAUTs synthesize pectic domains required for plant cell wall architecture: An example of how “polysaccharide” structural determination provides unique understanding”*

Dr. Melani Atmodjo

10:15 a.m. – 11:00 a.m.

Lecture – *“Introduction to High Performance Anion Exchange Chromatography”*

----- for monosaccharides and oligosaccharides analysis

Dr. Parastoo Azadi

11:15 a.m. – 12:00 a.m.

Lecture – *“Preparative and Analytical Size Exclusion Chromatography of Polysaccharides”*

----- a practical approach for isolation and purification of polysaccharides

Dr. Stephanie Archer-Hartmann

12:00 p.m. – 1:30 p.m. – **LUNCH**

1:30 p.m. – 2:30 p.m.

Lecture – *“Introduction to Xyloglucan Structure and Biosynthesis”*

Dr. Breeanna Urbanowicz

2:45 p.m. – 3:45 p.m.

Lecture - *“Glycome Profiling “*

Dr. Michael Hahn

4:00 p.m. – 5:00 p.m.

Lab demo and data analysis of PMAA linkage analysis

Dr. Artur Muszynski/Ian Black