

# From Stereocontrolled Glycosylation to Automated Chemical Synthesis

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## Abstract

From the building blocks of nature to disease-battling pharmaceuticals, carbohydrates have had a profound impact on evolution, society, economy, and human health. Numerous applications of these essential biomolecules in many areas of science and technology exist, most of which can be found at the forefront of therapeutic agent and diagnostic platform development. Although carbohydrates are desirable for the pharmaceutical and biomedical communities, these molecules are very challenging targets for chemists because of the need for functionalization, protecting and leaving group manipulations, controlling anomeric stereoselectivity, separation, and analysis. The development of practical methods for the synthesis of building blocks, chemical glycosylation, and glycan assembly represent demanding areas of research.

At the core of this presentation is the development of new methods, strategies, and technologies for chemical synthesis of glycans. These tools will be discussed along with recent results related to the development of new glycosylation reactions, methods for controlling stereoselectivity, and HPLC-based automated synthesis. The effectiveness of methods developed will be illustrated by the synthesis of glycopharmaceuticals.

## Biography

Alexei Demchenko was born (1965), raised, and educated in Moscow, Russia. He graduated from the Mendeleev University of Chemical Technology of Russia with a Diploma (M.S.) in Chemical Engineering (1988) before joining the laboratory of the late Professor Kochetkov at the Zelinsky Institute of Organic Chemistry in Moscow. In 1993, he was awarded a Ph.D. in organic chemistry by the Russian Academy of Sciences for his work on the development of thiocyanate methodology for glycosylation. After two post-doctoral years under Kochetkov, he joined Professor Boons' group at the University of Birmingham (UK) as a BBSRC post-doctoral research fellow. In 1998, he moved to the Complex Carbohydrate Research Center, University of Georgia (USA) as a research associate. In 2001, he joined the faculty at the University of Missouri - St. Louis as an Assistant Professor where he was promoted to the rank of Associate Professor with tenure (2007) and Professor (2011). In 2014, Demchenko was appointed Curators' Distinguished Professor of Chemistry and Biochemistry. In 2021, Demchenko joined the faculty at Saint Louis University as Professor and Department Chair.