Automated Glycan Assembly as Enabling Technology for the Glycosciences

Peter H. SEEBERGER [1],

[1] Max-Planck Institute for Colloids and Interfaces, Am Muehlenberg 1, 14476 Potsdam, Germany

peter.seeberger@mpikg.mpg.de

Automated glycan assembly (AGA)[1] allows for preparation of diverse oligo- and polysaccharides[2] on a solid support employing a synthesizer.[3] Microwave-heating accelerates capping, deprotection and functionalization steps of AGA.[4]

A better understanding of glycosylation reactions is needed in order to optimize coupling steps and thereby shorten overall assembly times. We developed a continuous flow set-up to optimize glycosylations using minimal amounts of material while achieving high reproducibility.[5]

The data obtained using this set-up helped us to quantitate 13 parameters that influence glycosylations and enabled the use of machine learning techniques as a basis for predicting glycosylation outcomes.[6] Currently, reactivity and optimal glycosylation temperatures are correlated in order to further accelerate AGA.[7] Access to ever more complex glycans including cis-linked polysaccharides[8] and complex N-glycans[9]are enabling fundamental investigations into the structure and function of polysaccharide materials,[10] vaccines[11]and diagnostics.

Bibliographic references:

1. J. Am. Chem. Soc., 2019, 141, 5581.
2. J. Am. Chem. Soc., 2020, 142, 8561.
3. Proc Nat Acad Sci USA, 2017, 114, E3385.
4. J. Am. Chem. Soc., 2021, 143, 8893.
5. J. Am. Chem. Soc., 2018, 140, 11942.
6. Chem. Sci. 2021, 12, 2931.
7. Angew.Chem.Int.Ed. 2022, 61, e202115433.
8. J. Am. Chem. Soc., 2021, 143, 9758.
9. in preparation.
10. Nature 2020, 582, 375; Nature Chem. 2023, in press.
11. Chem. Rev. 2021, 121, 3598.