

2nd European Organic Chemistry Congress

March 02-03, 2017 Amsterdam, Netherlands

Focusing on practical aspects of synthetic carbohydrate chemistry: Opportunities for simplification and innovation

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Over the last decades, remarkable advances have been recorded in the area of synthetic carbohydrate chemistry with the introduction of either new strategies for the selective derivatization of the numerous sugar functional groups and improved approaches in glycosidation chemistry. These advances were strongly spurred by the urgent need for ever more efficient and straightforward routes to oligosaccharides of biological or pharmacological interest. At the same time, carbohydrates have maintained their role of privileged precursors for the synthesis of highly functionalized chiral compounds. Despite these advances, most of the synthetic routes applied to carbohydrates are entailing experimentally demanding conditions, with frequent use of sensitive and/or costly reagents, and lengthy and laborious procedures. In this, our laboratory aimed at development of practically convenient synthetic strategies and methodologies in carbohydrate synthesis. The first part discussed the implementation of fully catalytic schemes for oligosaccharide assembly via one-pot multistep sequences based on the exclusive use of moisture stable glycosidation promoters. In the second part is discussed the versatile application of the iodine/silane combined reagent in a diversified set of transformations ranging from glycosidation reactions to the selective fast manipulation of saccharide functional groups. In the final part, recent results concerning the implementation of extremely simple procedures for regioselective alkyl and acetal protection of saccharide compounds via solvent-free approaches, whose scope can be further expanded in the development of fully solvent free one-pot sequences leading to saccharide derivatives with a diversified profile of protecting groups are discussed.

Biography

Alfonso Iadonisi was a Researcher in Organic Chemistry at Naples University Federico II and currently, he is an Associate Professor at Naples University Federico II since 2012. His main scientific interest is Organic Synthesis, with a special focus on Carbohydrate Chemistry. During his carrier, he developed a large number of methodologies and strategies for oligosaccharide and glycoconjugate synthesis, and the functional manipulation of saccharide compounds. Most of these methods were also usefully applied (not only in his laboratory) in the synthesis of biologically relevant targets. He is the co-author of over 70 scientific publications.

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