El-Kirat-Chatel, S, Beaussart, A, Alsteens, D, Sarazin, A, Jouault, T. and Dufrene, Y. (2013). Single-molecule analysis of the major glycopolymers of pathogenic and non-pathogenic yeast cells. *Nanoscale*. Jun 7;5(11):4855-63

Most microbes are coated with carbohydrates that show remarkable structural variability and play a crucial role in mediating microbial-host interactions. Understanding the functions of cell wall glycoconjugates requires detailed knowledge of their molecular organization, diversity and heterogeneity. Here we use atomic force microscopy (AFM) with tips bearing specific probes (lectins, antibodies) to analyze the major glycopolymers of pathogenic and non-pathogenic yeast cells at molecular resolution. We show that non-ubiquitous β-1,2-mannans are largely exposed on the surface of native cells from pathogenic Candida albicans and C. glabrata, the former species displaying the highest glycopolymer density and extensions. We also find that chitin, a major component of the inner layer of the yeast cell wall, is much more abundant in C. albicans. These differences in molecular properties, further supported by flow cytometry measurements, may play an important role in strengthening cell wall mechanics and immune interactions. This study demonstrates that single-molecule AFM, combined with immunological and fluorescence methods, is a powerful platform in fungal glycobiology for probing the density, distribution and extension of specific cell wall glycoconjugates. In nanomedicine, we anticipate that this new form of AFM-based nanoglycobiology will contribute to the development of sugar-based drugs, immunotherapeutics, vaccines and diagnostics.