From the study of plant cuticles to the valorization of fruit pomaces

One of our challenges is to understand how the peel of plants (a natural hydrophobic composite also known as the cuticle) is formed and how its architecture determines the protective properties of this cuticle. Indeed, the plant cuticle is a complex polymer matrix that protect all aerial organs of plants and fulfils multiple biological roles such as: protection against climatic stress (temperature, drought, UV), pathogens, fruit preservation, etc.

While these functional properties depend largely on the structural features of cuticles, its architecture is not yet fully elucidated. Therefore, the aim of our study is to decipher the structure-functions relationships of plant cuticle using tomato fruit as a model, taking advantage of the well-described growth of tomato fruit and the large genetic diversity to study the assembly of the cuticle. Moreover, by using the information on the structure of plant cuticle we also develop strategies for adding value to these peels once they become a co-product (particularly in the fruit canning industry). In particular, example of plant defense and bio-sourced and bio-inspired polymers will be presented. Our originality lies precisely in this interface between plant biology and polymer chemistry.

Dr. Bénédicte Bakan is a senior scientist at INRAE Nantes (BIA) and develops multidisciplinary research on the cuticle biopolymer structure and biosynthesis in relation to its functional and technological properties.

The different strategies developed for the polymer characterization enabled deciphering the function of CUS1 (cutin synthase) and gaining new insight into the cutin polymer structure, in collaboration with INRAE Bordeaux (C Rothan's group).

This research also led to the development of different cracking processes of cutin-rich biowastes for the non-food end-uses (3 patents) of hydroxylated-fatty acids in the context of industrial partnership.