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THE POTENTIAL OF SCATTERING TECHNIQUES TO INVESTIGATE THE STRUCTURE AND MOLECULAR INTERACTIONS OF POLYSACCHARIDES

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Scattering techniques represent an excellent tool for the structural characterization of natural polysaccharides since they involve minimal sample preparation and do not require drying processes which can strongly affect the native structure of hydrated systems. However, the application in this field is still a largely unexploited area due to their specificity and the complexity of data manipulation and interpretation.

In this talk, the application of small angle X-ray and neutron scattering (SAXS and SANS) as well as wide angle X-ray scattering (WAXS)/X-ray diffraction (XRD), in combination with complementary methods such as differential scanning calorimetry (DSC), spectroscopy and morphological characterisation, to investigate the structure and molecular interactions of polysaccharides in hydrated systems with different practical applications, such as the following: (i) plant cell wall (PCW) materials, including model hydrogels based on pure cellulose and composites with PCW polysaccharides (arabinoxylan, xyloglucan, mixed linkage glucans and pectins), mature cotton fibres and food-extracted PCWs; (ii) starch-microalgae aqueous blends for the development of functional foods and biodegradable packaging materials; (iii) gelatin/ -carrageenan encapsulation structures for the controlled release of bioactive compounds.

These examples highlight the potential of small angle scattering techniques to provide valuable insights on the structure and molecular interactions of polysaccharides in a wide variety of hydrated systems.

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