

Synthesis of Polysaccharide Macrobolaforms

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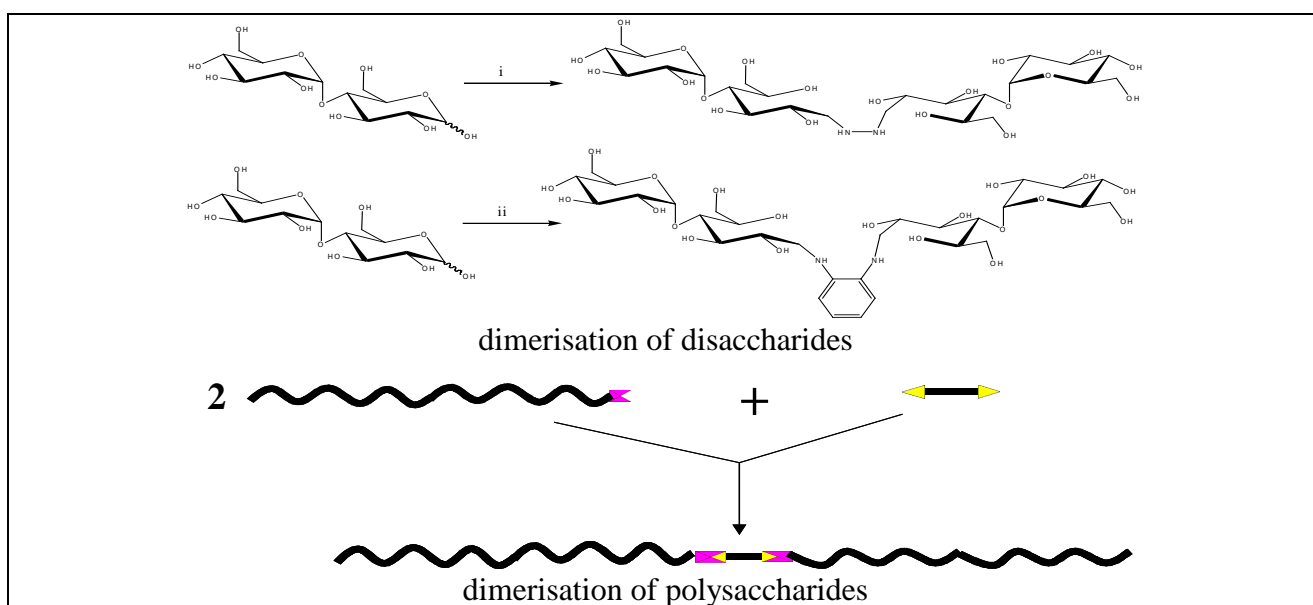
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Neutral polysaccharides are very abundant renewable natural products that have been identified as alternative substrates for use in the field of polymer commodities¹. Unfortunately beside other obstacles such as hydrophilicity, polysaccharides can display very low shape factors (molecular length/width) as compared to common synthetic polymers. This shape factor is often unsuited for creating the molecular entanglements, necessary for material physical cohesion for applications in the field of plastic material.

In order to overcome this drawback various strategies have been applied to extend the length of these macromolecules, from controlled chemical cross-linking to macromolecular fractionation. Due to the very large number of chemically similar hydroxyl functions present on the macromolecular polymer backbone, selective chemical intermolecular-linking of hydroxyl groups is almost impossible to control, and very rapidly leads to unsuited tri-dimensional networks². Taking advantage of the unique chemical nature of one of the extremities (the reducing end) we developed several techniques of selective dimerisation of oligo- and polysaccharide, using diamine and dicarboxylic linkers. These dimerisations resulted in saccharidic bolaforms with improved shape factor by doubling of the molecular length. In the case of large polysaccharides the obtained macrobolaforms displayed interesting improved mechanical properties³.

Preliminary investigations of the structure/property relationships of these macrobolaforms show an improvement of mechanical behaviour, which was linked to the shape factor improvement and also to the ability to form oriented structures during material extrusion



¹ Mohanty, A.,K.; M. Misra, M.; and Drzal L. T. *Journal of Polymers and the Environment* **2002**, 10, 19-26.

² Follain, N.; Joly, C.; Dole, P.; Bliard, C. *Carbohydrate Polymers* **2005**, 60, 185–192

³ Monnet PhD thesis Université de Reims Champagne Ardenne dec 2008.

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