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STARCH BASED HOT MELT ADHESIVES AS BIO-BASED ALTERNATIVES TO CONVENTIONAL SYSTEMS

Paper-based packaging offer environmentally friendly and sustainable packaging options for a broad spectrum of different goods. Its renewable feedstock and good recyclability make paper an environmentally-conscious alternative to many plastic based options. However, the manufacturing of paper-based packaging often requires different adhesives, especially hot melts, for their construction. Currently used hot melts are complex formations of base polymers, tackifiers (resins) and waxes. Since the currently used base polymers in conventional formulations are petrochemical polymers such as EVA, their usage diminishes the “green character” of paper-based packaging. Hence, the substitution of petrochemical components in adhesive formulations with bio-based alternatives would significantly improve the sustainability of used hot melts and paper products.

Since the development of thermoplastic starch, efforts have been made to use starch- and carbohydrate-based polymers for hot melt adhesives, though no product has made it to the market yet. In our recent work, we produced different starch esters by means of reactive extrusion, allowing for the modification of starch in high consistency. By modifying the reaction conditions, the degree of substitution and consequently the thermoplastic properties of the produced esters can be controlled, allowing to produce starch esters with comparable properties to conventional hotmelt adhesives. With these novel bio-based polymers, it may be possible to replace petrochemical components in hot melt adhesives and thus offer more sustainable adhesive systems for the paper and packaging industry.