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Local, circular and sustainable: new raw materials for the production of cellulose filaments (#HEREWEAR)

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Textile production is a large industrial sector with substantial economic and environmental impacts. The HighPerCell® process is a sustainable technology for spinning of cellulose using ionic liquids as direct solvent, resulting in cellulose filaments with textile and technical mechanical properties. The process relies on the feedstock, ionic liquid as solvent and water as coagulant.[1,2] There are no further additives for the spinning process itself needed. No waste water is produced, while mild processing temperatures and a nearly complete solvent recovery are achieved. Beside classical feedstocks such as dissolving wood pulp that are usually used in industrial spinning processes, HighPerCell® technology allows the processing of the broad variation of feedstocks due to higher tolerances of metal ions and acceptance feedstock side-educts like lignin for instance.

Within the EU funded HEREWEAR project bio-based waste sources, specifically agricultural and seaweed residues, are investigated as feedstock for the HighPerCell® process. Wheat straw (WS) was selected as a local feedstock due to its high availability and high cellulose content. Pulp fractionation is performed via pre-extraction mild acetone organosolv (FABIOLA™ process) and alkaline treatment to maximise the recovery of a raw cellulosic material.[3,4] The resulted pulps were successfully processed via ionic liquids into HPC® filaments made from 100% wheat straw. The first prototypes have shown the technical feasibility of the bio-based garments with good properties of the wheat straw cellulose-based textiles.

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