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ONE-STEP-PRODUCTION OF SUPERHYDROPHOBIC PLASTICS SURFACES

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The surface modification of existing products by means of etching, painting or plasma coating is usually very time-consuming and expensive. A new approach is the development of a process technology for the production of superhydrophobic micro-structured surfaces directly in the injection moulding process, without using additives or material combinations. Variothermal process control is being used for the precise replication of the microstructured surface. To heat the cavity surface efficiently, an external inductive heating unit has been implemented. In a statistical design of experiment, characteristic injection moulding parameters have been varied. The trials have been done with conventional and variothermal process control. The functionality and the moulding accuracy of the polymer surfaces have been analysed by scanning electron microscopy and contact angle measurements. While the injection moulding parameters hardly impact the moulding accuracy of the surface and its wettability, the use of variothermal process control magnificently changes the surface replication and the wetting properties. A complete filling of the mould structures and a stretching of the structures during demoulding could be observed, leading to the creation of a hair-like structure with extremely high aspect ratios. Contact angles of up to 165° towards water were measured. The process is capable of producing superhydrophobic surfaces in a single process step.