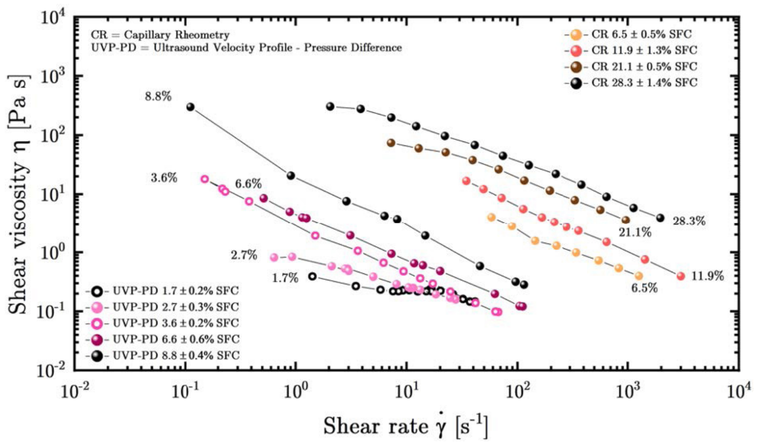
BRIDGE DISCOVERY
SYNCHRONOUS MULTISCALE 3D-PRINTING PROCESS

The BRIDGE Discovery project SYMUS-3DP is researching the novel production of sensory and nutritionally functionalised foods. Relevant macro, meso and microscale production methods are being investigated and tailored for the chocolate confectionery industry. Laufzeit 4 Jahre, Budget 1.8 Mio CHF.

CHOCOLATE BASE

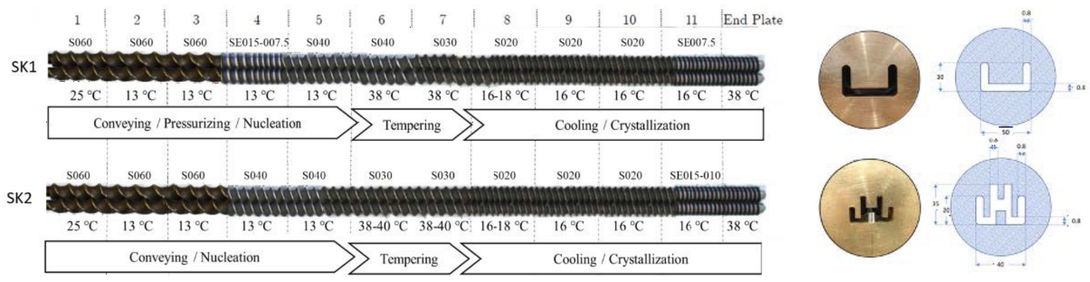
Chocolate confectionery masses are non-Newtonian yield point liquids and exhibit shear rate and time dependent viscosity properties (shear thinning and thixotropic).



Shear viscosity measured for various solid crystalline cocoabutter high pressure capillary rheometer (CR) and in-line Ultrasound Doppler device (UVP-PD)

MACRO-PRINTER

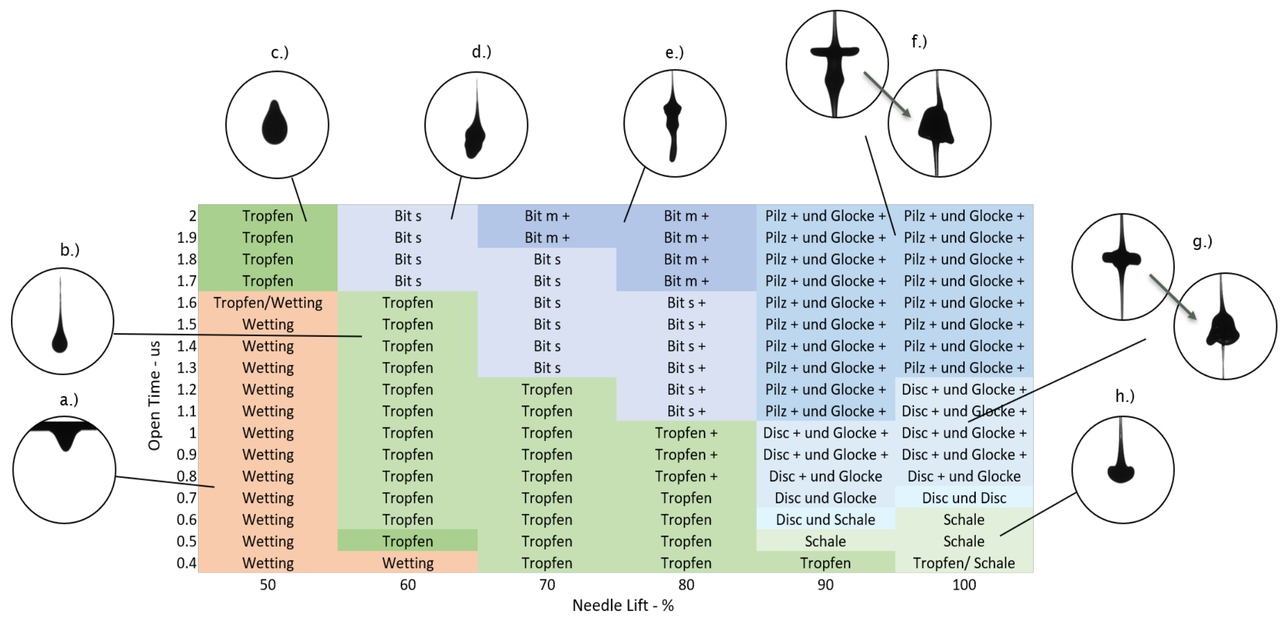
The chocolate base is extruded as an endless profile onto a conveyor belt. The meso and micro structures are then printed into the cavities.



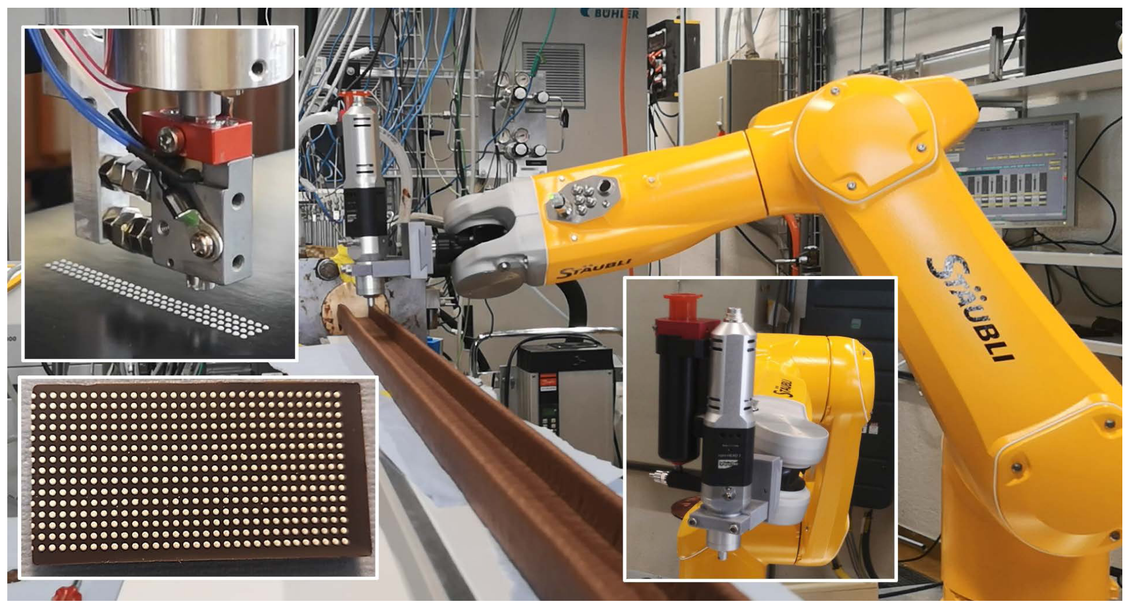
Twin screw extruder setup for the macro-printer with die geometries for the chocolate extrusion

MESO- AND MICRO PRINTER

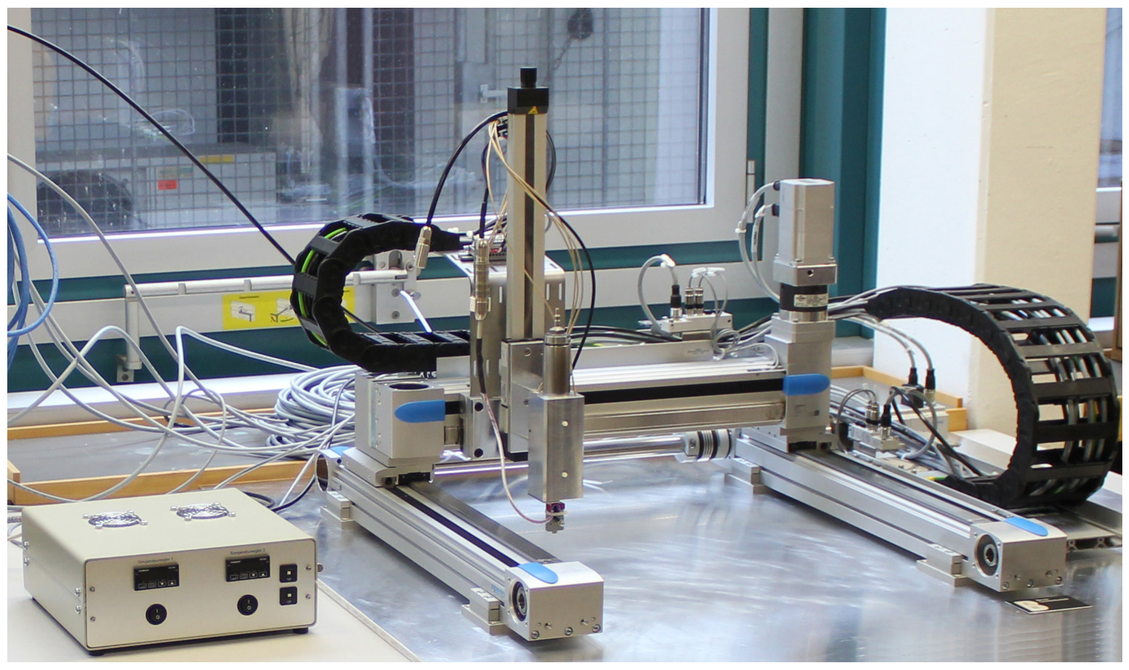
Additional flavoured chocolate in solid or foamed low-calorie form is applied by micro-extruder (meso) or printed as dots by micro-valve (micro) on the profile



Jetting drop shape analysis for dispenser suitability characterization with focus on cocoa butter suspension-, emulsion and micro-foam systems



Ensemble of macro/meso/micro-scale print setups (a) Micro-nozzle, (b) Viscotec meso-print extruder, (c) Bühler macro-print extruder, (d) aroma/flavor dots



IDT 3D-dotting platform at ETH consisting of a robot, a controlling software, a micro valve and a temperature-controlled cartridge for high pressures (up to 20bar)

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Zusammenarbeit/Partner:
BRIDGE
FNSNF Schweizerischer Nationalfonds zur Förderung der wissenschaftlichen Forschung
ETH zürich Laboratory of Food Process Engineering
BFH-HAFL Food Science & Management