

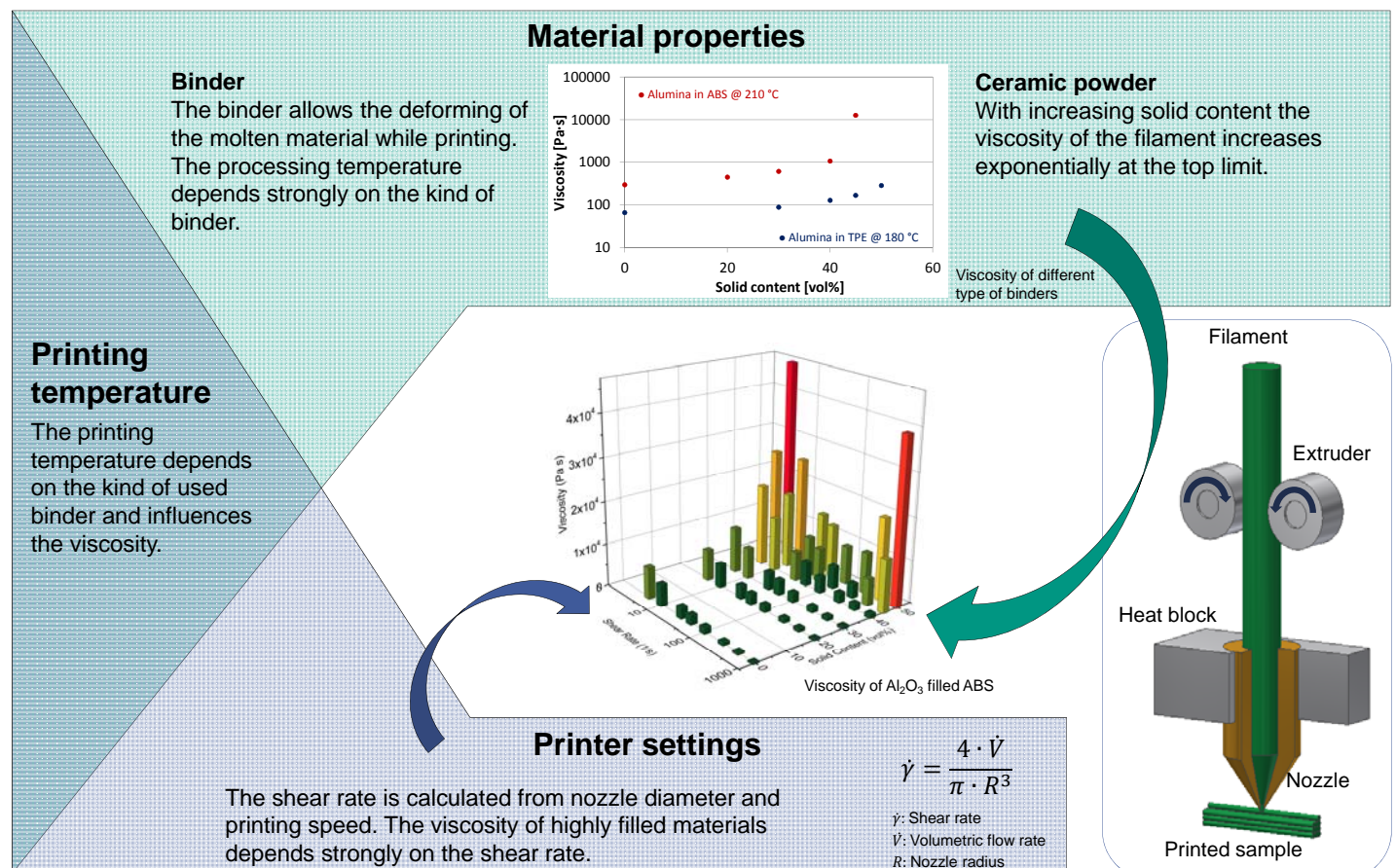
Filament development for the additive manufacturing of ceramic parts via Fused Deposition Modelling (FDM)

D. Nötzel, T. Hanemann

Summary

Methods to manufacture pure ceramic objects by rapid prototyping are very rare. Therefore a new process chain to use the FDM-technology for 3D printing of ceramics is introduced.

A central point of developing a new high filled filament material is the viscosity of the molten material. The material itself influences the viscosity at very high solid contents. The type of binder defines the printing temperature range while the viscosity decreases with increasing temperature. The printer settings, like nozzle diameter and printing speed, define the shear rate, which influences the viscosity of the molten filament.

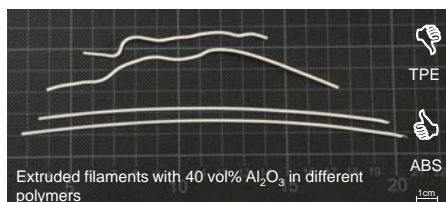


Extruding filaments

Even though rotational viscosity of the material seems to be optimal, extruding filaments to feed the printer does not work properly.



Extruder to prepare filaments



Thermal postprocessing

Before sintering the polymer binder has to be removed very slowly to prevent ruptures. The kind of debinding depends on the chemistry of the used binder. The ceramic material influences the sintering steps.

