# PHOTORHEOMETER WITH RT-FTIR COUPLING AS INNOVATIV TOOL TO ASSESS PHOTOPOLYMERS FOR 3D PRINTING

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Additive Manufacturing Technologies (3D printing) have reached great popularity over the last decades, not only for rapid prototyping but also biomedical applications like customized scaffolds for tissue regeneration. In many of these applications high resolution, tough materials and high throughput are desired. Techniques based on photopolymerization such as digital light processing (DLP) based stereolithography (SLT) offer the possibility to create such materials. Unfortunately, it is very time and material consuming to optimize the printing parameters for each and every formulation to achieve optimal results. Therefore, we investigated the possibility to use photorheology coupled with real-time IR measurements to determine parameters suitable for 3D printing. The required amount of formulation is minimal (around 200 µl) with high throughput (<10 min per measurement). The possibility to access a multitude of system values allows an insight in polymerization characteristics crucial for DLP-SLT such as conversion, storage- and loss modulus, shrinkage, and gel point. Even post-curing behavior can be examined by using different light sources and/or irradiation dosages. Certain parameters can be defined to classify a specific formulation towards its suitability for the respective printing process, saving both time and material. Therefore photorheology is the perfect technology to assess the suitability of photopolymers for DLP-STL.

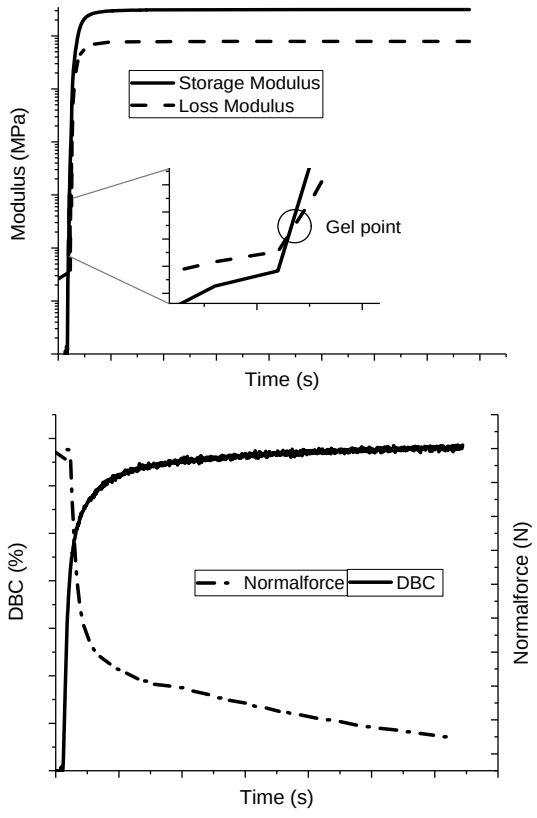


Fig.1 Example curves of conversion and normal force over time (top) Example curves of storage- and loss modulus over time with gel point at intersection (bottom)