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*Abstract*

# Novel system for ultrasound-assisted mixing of photopolymers with nanoparticles for additive manufacturing

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Additive manufacturing provides enormous freedom in the design of parts and is therefore suitable to produce personalized medical phantoms and test specimens. In particular, the layer-by-layer curing of liquid photopolymers using direct light processing makes it possible to produce phantoms with defined physical properties [1,2]. For this purpose, nanoparticles are introduced into the liquid photopolymers prior to processing. To obtain phantoms with defined concentrations of nanoparticles, a special equipment is required to mix nanoparticles with photopolymers, disperse them and then feed them to an additive manufacturing device.

We developed a novel automated mixing and homogenization system in which the liquid photopolymer is pumped from a storage tank through a flow cell in which the final homogenization process, based on ultrasound mixing, takes place. In the flow cell, the nanoparticles are inserted via an injection system. The flow cell was manufactured by additive manufacturing. To ensure the required process stability, this unit was additionally equipped with appropriate monitoring devices (volume, concentration, temperature).

In our contribution we present the new material preparation process and the development of the automated mixing and homogenization system.

**AUTHOR'S STATEMENT**
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