



Photocurable Ceramic Slurries for 3D Printing

Ready-to-use, high-solid-loading ceramic and piezoceramic slurries for Digital Light Processing (DLP)/Lithography-based Ceramic Manufacturing (LCM) 3D printing — from formulation to sintered part.

Institution



CEITEC – Central European
Institute of Technology,

Brno University of Technology

Development Status

TRL 6–7 (Technology
Readiness Level).

IP Protection Status

Proprietary formulation and
production know-how,
developed and held internally
by CEITEC, Brno University of
Technology; not licensed to a
third party.

Partnering Strategy

Ready-to-use slurries for
direct sale, or custom
formulation development — via
spin-off Ceraprint s. r. o.

The Problem

Developing a stable, printable ceramic slurry for vat photopolymerization (SLA/DLP/LCM) is a major bottleneck for adopters of ceramic 3D printing. A usable slurry must combine high solid loading — needed for dense, low-shrinkage parts after sintering — with a viscosity low enough for DLP/LCM processing, plus a photoinitiator system matched to the printer's light source. Formulating such a system from scratch for every new powder or application requires deep in-house expertise in colloid chemistry and photopolymer science, and is one of the main barriers keeping manufacturers from adopting ceramic 3D printing.

Technology Description

The technology comprises a family of photocurable ceramic and piezoceramic slurries, ready to use on DLP/LCM 3D printers operating at 455–465 nm (blue light), together with the underlying formulation know-how. Available materials include CeraAlu (Al_2O_3 alumina, ~79 wt% solids, 97–98.5% of theoretical density after sintering), CeraBTO (lead-free BaTiO_3 piezoceramic, ~85 wt% solids, $d_{33} \approx 448$ pC/N), CeraHAp (hydroxyapatite for tissue engineering, ~65 wt% solids), CeraTCP (β -TCP with enhanced resorbability), and a multi-material HA+TCP system for bi-ceramic structures; AlN, ZTA, and 3Y-TZP formulations are in development.

For customers developing their own material systems, CeraMix — a photocurable polymer premix (viscosity ~250 mPa·s) — is offered as a ready-made carrier system into which a customer's own ceramic powder can be dispersed, shortening formulation development from months to weeks.

Commercial Opportunity

Ready-to-use slurries and premixes remove the single largest technical barrier to adopting ceramic vat photopolymerization, letting manufacturers, research institutions, and 3D printing service providers start printing and testing parts without developing their own material system in-house. This is directly relevant to producers of technical and bioceramic components — piezoelectric sensors/actuators, bone graft scaffolds, wear-resistant alumina parts, complex geometry ceramic shapes — and to printer manufacturers seeking qualified materials for their platforms. Offered via spin-off Ceraprint s. r. o. as ready-to-use slurries or as custom formulation development for a customer's own powder and application.