

# Polymer-Bioactive Glass Composite Filaments for 3D Scaffold Manufacturing by Fused Deposition Modelling: Fabrication and Characterization

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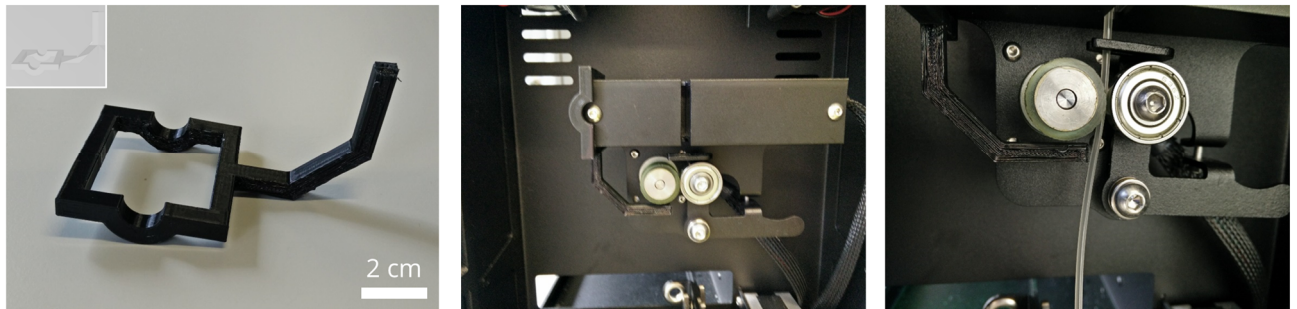
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**\* Correspondence:**

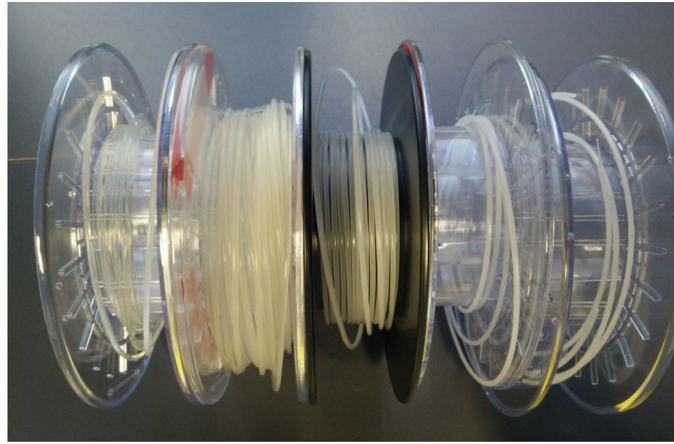
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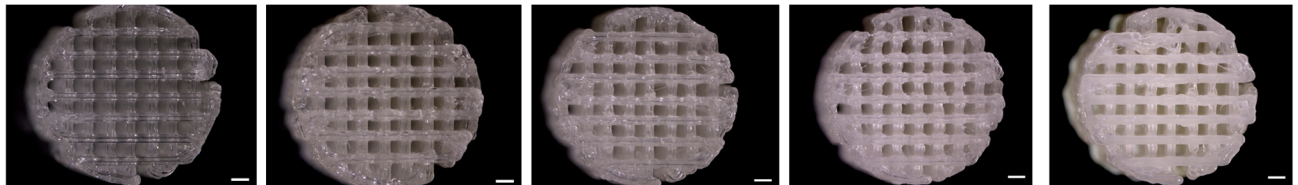
## Supplementary Information



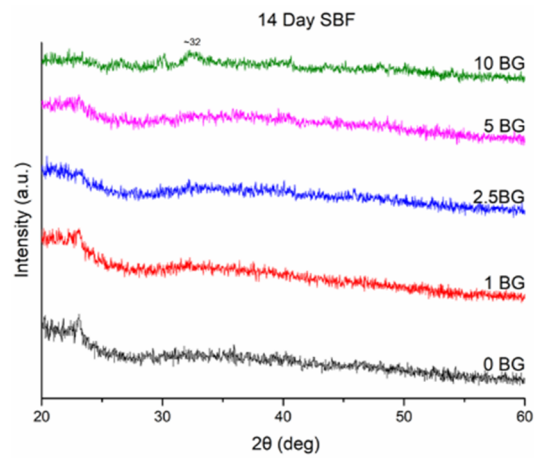
**SUPPLEMENTARY FIGURE 1** | Support structure to avoid filament adhesion and coiling on the puller wheels (right image) for 3Devo NEXT Filament maker. CAD \*.stl file available for download in the supporting information.



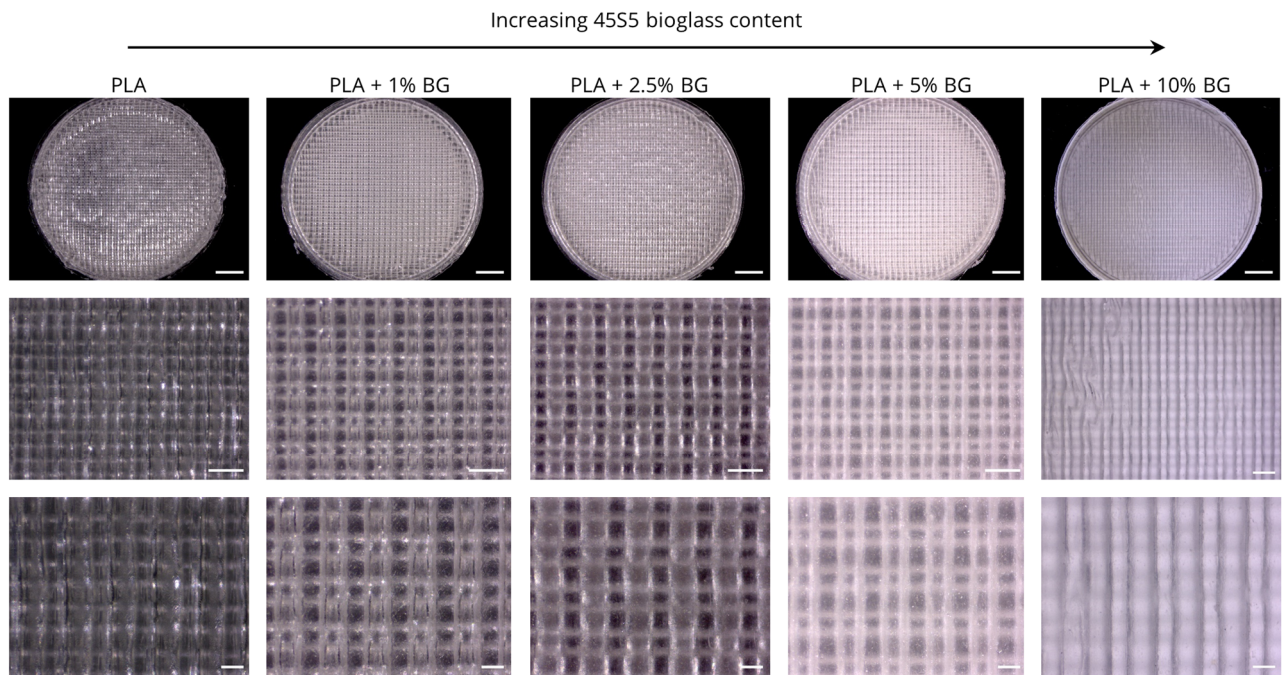
**SUPPLEMENTARY FIGURE 2** | Spooled filaments of PLA-BG with different bioglass content. From left to right: PLA, PLA-1%BG, PLA-2.5%BG, PLA-5%BG, PLA-10%BG.



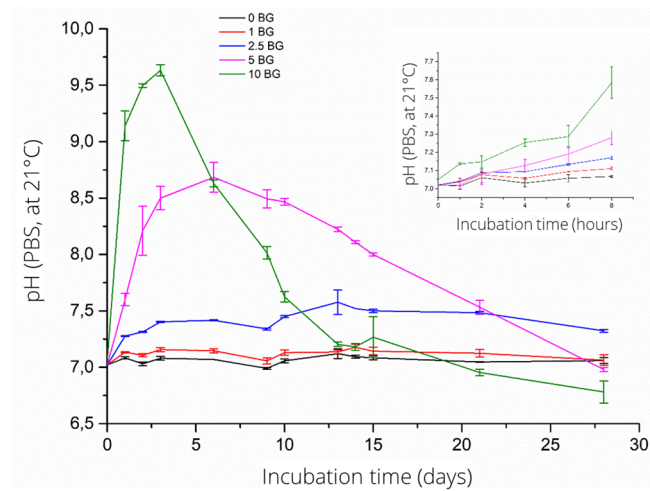
**SUPPLEMENTARY FIGURE 3** | Light microscopy images of PLA-BG scaffolds with 0%, 1%, 2.5%, 5% and 10% (w/v) Bioglass (left to right). Scale bar: 1 mm.



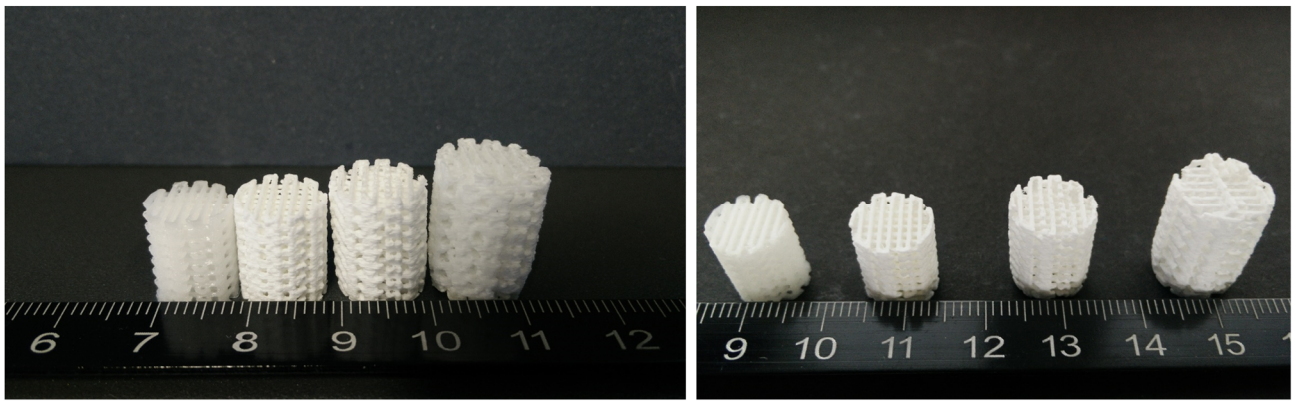
**SUPPLEMENTARY FIGURE 4** | X-ray diffraction analysis (XRD) of PLA-BG squares after 14 days of incubation in SBF. Peak development at  $\sim 32^\circ$   $2\theta$  indicating crystallinity for PLA-10% (wt)BG composition of highest BG content.



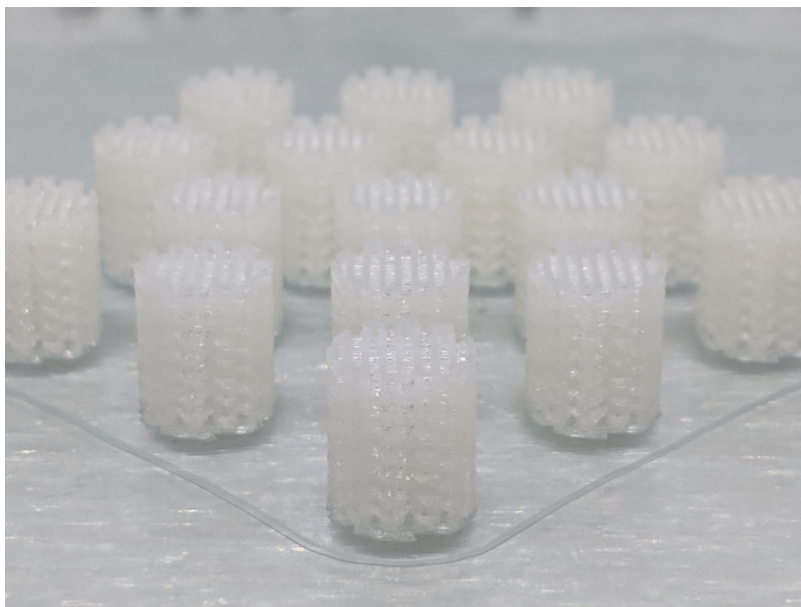
**SUPPLEMENTARY FIGURE 5** | 3D printed PLA-BG discs for in-vitro biocompatibility assessment. Light microscopy images illustrating patterned surface of 3D FDM printed PLA-BG discs; scale bars: 2000  $\mu\text{m}$  (top row), 500  $\mu\text{m}$  (mid row), 200  $\mu\text{m}$  (bottom row).



**SUPPLEMENTARY FIGURE 6** | 3D printed PLA-BG discs immersed in PBS at 37°C for different time points. pH development depicted with rapid pH increase for 5% and 10% (wt) BG containing PLA associated to BG dissolution.



**SUPPLEMENTARY FIGURE 7** | 3D printed PLA-BG scaffolds incubated in PBS for 28 days. From left to right: PLA, PLA-1%BG, PLA-2.5%BG, PLA-5%BG scaffolds. Scaffold swelling is indicated with increasing bioglass content.



**SUPPLEMENTARY FIGURE 8** | Simultaneous manufacturing of sixteen PLA-BG scaffolds in one print using the 3D printer

**Supplementary TABLE S1** | Printing parameter details for producing PLA-BG scaffolds.

<b>Parameter</b>	<b>Value</b>
<i>Print core</i>	0.25
<i>Ahesion type</i>	Skirt
<i>Layer height</i>	0.2
<i>Layer height 0</i>	0.1
<i>Prime tower enable</i>	False
<i>Position</i>	0
<i>Bottom layers</i>	5
<i>Infill overlap</i>	0
<i>Infill pattern</i>	Lines
<i>Infill sparse density</i>	100
<i>Initial layer line width factor</i>	100
<i>Line width</i>	0.4
<i>Material flow</i>	100
<i>Material print temperature</i>	160
<i>Build plate temperature</i>	55
<i>Retraction hop enabled</i>	false
<i>Speed layer 0</i>	25
<i>Speed print</i>	30
<i>Speed topbottom</i>	25
<i>Speed travel</i>	100
<i>Speed travel layer 0</i>	100
<i>Speed wall</i>	25
<i>Speed wall 0</i>	25
<i>Top layers</i>	5
<i>Wall line count</i>	1
<i>Wall thickness</i>	0.7
<i>Generate support</i>	false

**SUPPLEMENTARY Table S2** | PCR primers used and genes investigated in qRT-PCR analysis.

<b>Gene</b>	<b>Gene name</b>	<b>PrimePCR Assay ID</b>	<b>Gen Bank No.</b>
<i>COL1A1</i>	collagen type I (col I)	qHsaCED0043248	NG_007400.1
<i>VEGFA</i>	vascular endothelial growth factor A (vegfa)	qHsaCED0043454	NG_008732.1
<i>BGLAP</i>	bone gamma-carboxyglutamate protein (bglap, osteocalcin)	qHsaCED0038437	NT_004487.20
<i>RUNX2</i>	runt-related transcription factor 2 (runx2)	qHsaCID0006726	NG_008020.1
<i>ALPL</i>	alkaline phosphatase (alp)	qHsaCID0010031	NC_000001.10
<i>GAPDH</i>	glyceraldehyde-3-phosphate dehydrogenase	qHsaCED0038674	NC_000012.11
<i>YWHAZ</i>	14-3-3-zeta	qHsaCID0013897	NC_000008.10
<i>HPRT1</i>	hypoxanthine phosphoribosyltransferase 1	qHsaCID0016375	NC_000023.10