ARISTOTLE UNIVERSITY OF THESSALONIKI

RESEARCH COMMITTEE

METAL-ENRICHED (NANO)BIOPOLYMERS FOR FILAMENT CONSTRUCTION IN 3D-PRINTING BIOAPPLICATIONS

The activity pertains to the development of (nano)biopolymers (PLA, PCL) with soluble-bioavailable metal ionic forms at select concentrations. Thus, hybrid filaments arise with specific mechanical-biological properties for use in 3D-printing FDM technology devices, targeting products of antibacterial or bacteriostatic activity in aqueous environments. Concurrently, calcium compound addition (hydroxyapatite) leads to scaffolds promoting hard tissue development in bone implants. The collective activity is linked to the development of 3D-printer technology and selective printing heads for efficient control of material fusion conditions.

Application Field

- Development of hybrid metallo-nano(bio) polymers in 3D-(Bio)printing.
- Antibacterial surfaces for use in food-packaging and scaffolds for tissue development in biomedicine.
- Direct technological development-fabrication of 3D-printers and selective printing heads.

Services Offered to Third Parties

- Synthesis of hybrid metallo-nano(bio)polymer filaments for 3D-printing
- Development of antibacterial materials-surfaces for food-packaging
- Fabrication of 3D-printers and selective printing-heads
- Tissue scaffold development in biomedical education-training
- 3D-Printer fabrication know-how and (bio)products

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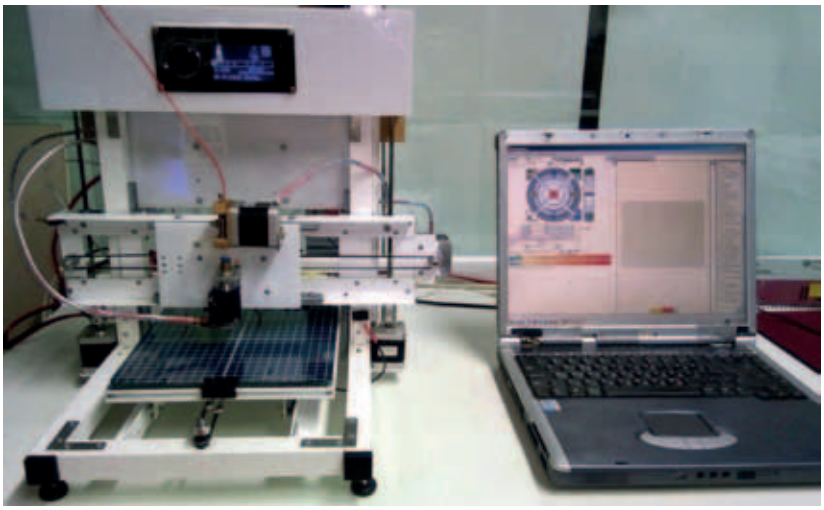

Figure 1. 3D Printer, supporting FDM Technology, built in the Laboratory

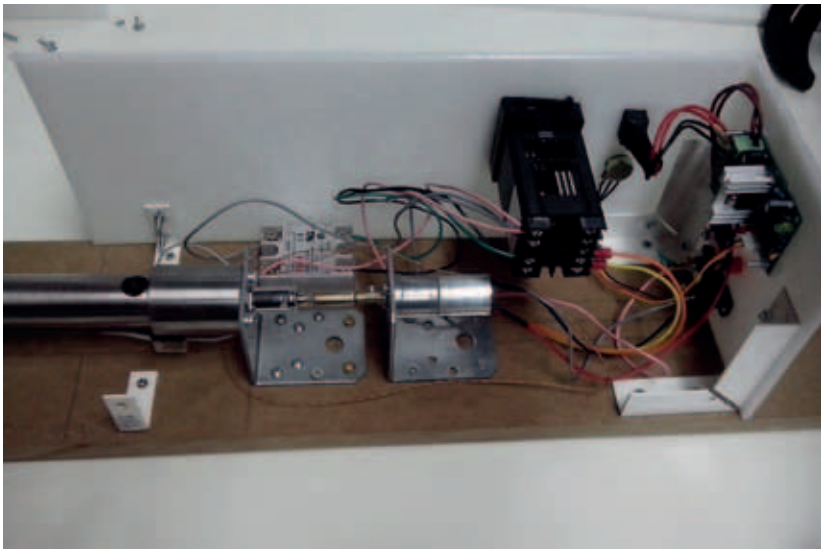

Figure 2. Extruder for d = 1.75 mm filament construction, built in the Laboratory

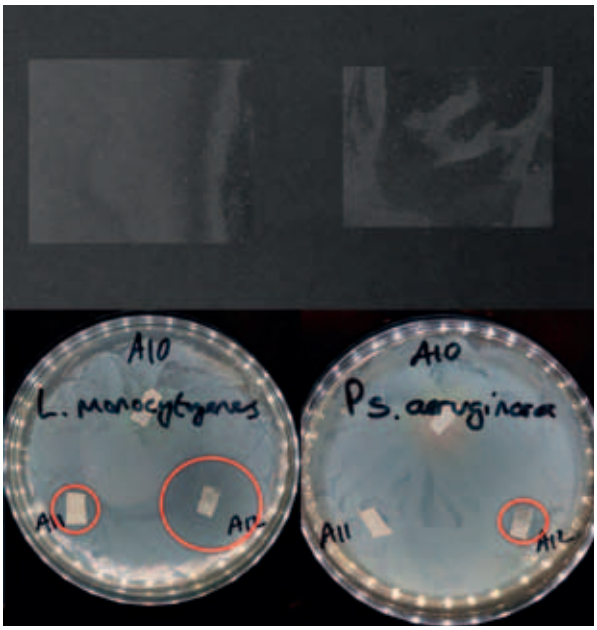

Figure 5. Enriched PLA antibacterial surfaces, built in the Laboratory

Figure 3. 1.75 mm diameter filaments, from PLA and PCL, enriched with metal complex compounds

Figure 4. Gyroid structure-based 3D scaffolds, constructed with 3D Printer

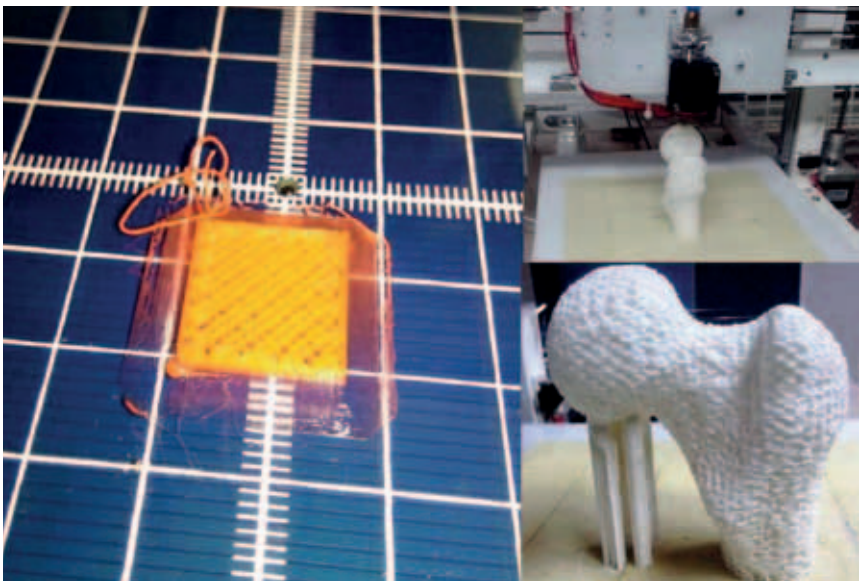

Figure 6. PLA 3D-printed specimens - Scaffolds - Bone section