Bious technology

3D$_f$ FIBRE PRINTING

We print 3D.
But instead of one, there are hundreds nano and micro filaments

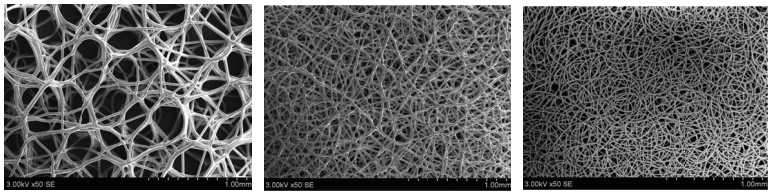
Working principle

3D$_f$ printers print many nano and micro filaments instead of a single filament. Such modification of traditional 3D printing technique introduces high-voltage electrostatic field which turns polymer filament into nano and micro sized fibres and pores.

These printers are fully customized to users requirements and are comprised of FDM unit, high voltage unit and climate control unit, packed in a compact and mobile installation. A combination of analogue and digital controls allow of continuous real time adjustment of polymer feed rate, voltage, travel speed, tip-to-collector distance, indoor temperature and humidity.

The FDM unit features:
- upside-down design, minimizing the probability of matrix defects due to dripping.
- filament based spinning, where only a small portion of filament is heated thus minimizing polymer degradation and related toxicity of fibres.

Examples of matrix morphology



Applications of fibrous matrixes:

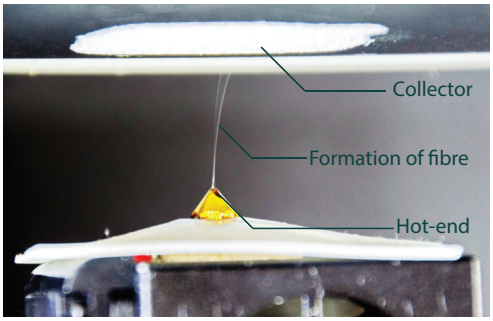
Tissue engineering
Drug delivery
Filtration
Reinforcement materials
Electrodes and sensors
Catalysis
Smart textiles
Solar cells
Food industry
CO_2 separation
Adsorption
Carbon nanotubes
Ceramics
Electrolyte membranes
Fuel cells

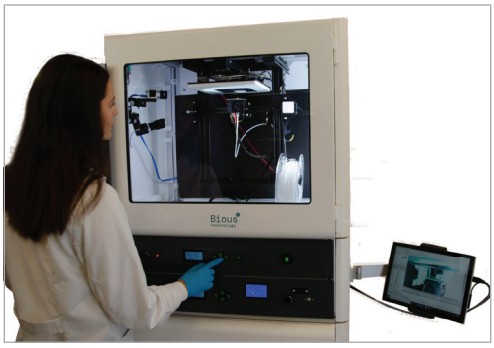
Types of materials for 3D$_f$ (not limited to):

Poly(ε-caprolactone)
Polylactic acid
Polyamide
Polybutylene succinate
Poly(lactide-co-glycolide)
Poly(methyl methacrylate)
Polyether block amide
Polyurethane

Potential additives:

Cellulose
Elastin
Chitosan
Wheat protein
Dextran





Bious technology

3D$_f$ FIBRE PRINTING

We print 3D.
But instead of one, there are hundreds nano and micro filaments

Unit Specifications:

Printing base:	FDM printer (filament based, printing area 250x250 mm)
Voltage:	5-20 kV
Tip-to-collector dist.:	5-30 mm
Polymer feed rate:	5-15 mg/s
Polymer melting T:	100-270 °C
Polymer filament diam.:	1.75-3.0 mm
Inside T:	20-35 °C
Inside RH:	30-80 %
Dimensions LxWxH:	830x620x1840 mm
Unit weight (w/o climate control):	65 kg
Unit weight (w/climate control):	105 kg

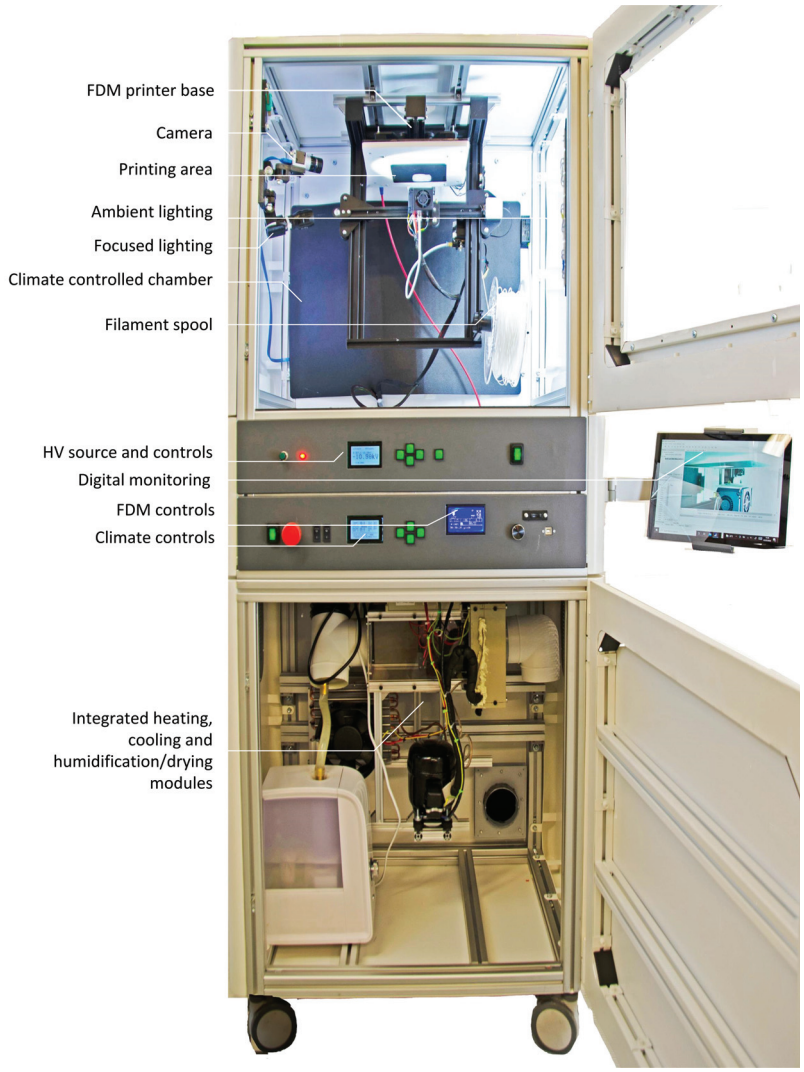
Configurations and Options

- Temperature- Assisted Fibre Formation (Cryogenic Solution/ Melt);
- Micropatterned Electrowiring;
- Near-Field Electrospinning;
- Post-Processing (Plasma, UV, chemical hydrolysis);
- Collecting in Liquid.

Matrix specifications

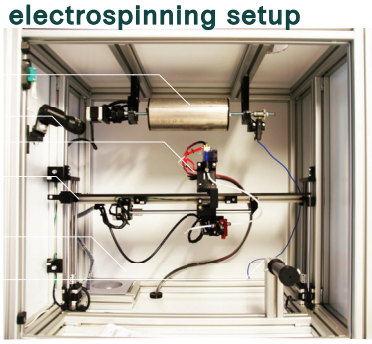
Fibre diameters	0.5-100 µm (3Df, melt) 0.1-30 µm (solution)
Pore diameters	5-200 µm (3Df, melt) 0.5-20µm (solution)
Porosity	70-95%
Matrix Morphology	Random, oriented, mixture

Components of 3D$_f$ printer

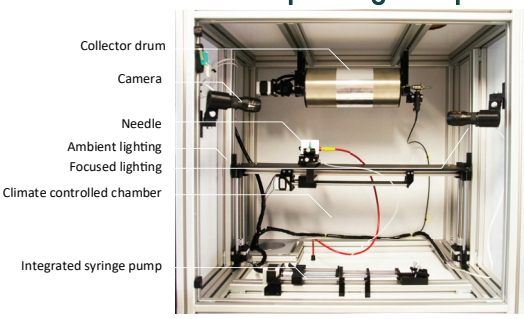


The installation may feature the 3D fibre printer, or conventional solution electrospinning or melt electrospinning setup.

Polymer melt (FDM filament based) electrospinning setup



Polymer solution electrospinning setup



Recent application:
doi.org/10.1016/j.bej.2022.108531
EPO and LT patent pending.

Supported by Agency for Science, Innovation and Technology under the project " Development and prototyping of the 3D fibre printing technology (Spin3Dp)", No TPP-03-008, in cooperation with Kaunas University of Technology

Bious Labs
Street address:
Draugystes g. 15D
LT-51227 Kaunas
Lithuania

Web: tech.biouslabs.com
Email: sales@biouslabs.com
Phone/WhatsApp: +370 675 24358
Bious Technology & Life