

Print Polymer Electronics and other Micro-Components

The new GeSiM MMP – Platform for printed electronics and more

Printed polymer electronics requires the combination of a wide range of materials such as metal inks, insulators, organic polymers with varying conductivities and ceramic pastes in a two- or three-dimensional circuitry. Applications are endless, e.g. polymer-based flexible displays and speakers, but also transducers and artificial muscles based on electro-mechanically active polymers and cells.

GeSiM's new **Multi-Material 3D Printer** is a unique platform that combines all these methods with optical metrology for versatile fine structuring. In a single instrument, it can combine extrusion (with compressed air, pistons, screws or filaments), drop-on-demand dispensing (piezoelectric and solenoid valve), pick & place, camera monitoring, 3D scanning, layer thickness measurements, and localized treatment with UV, IR and plasma. The platform can be placed on the bench-top or in a standalone clean-air cabinet.

Seven independently operating Z-drives can host print tools in practically **any** configuration; and all tools can be exchanged in a snap. The PLC-based control unit allows importing and printing of a variety of 2D and 3D data (build volume 240 mm × 412 mm × 100 mm).



GeSiM MMP, based on the BioScaffolder BS5.x family, in a 'smart' cabinet with safety door and HEPA filter. Accessory devices for the control of compressed air / liquid / vacuum or e.g. for measuring are placed behind the door underneath the printer. For a higher degree of automation, other modules, e.g. stackers, can be added in-line.

Dimensions (L×W×H) are 78×88×195 cm³ for the printer module and 78×78×195 cm³ for a stacker module.

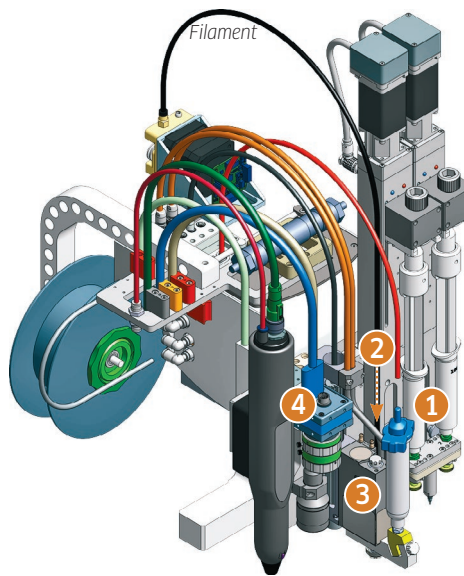
GeSiM Multi-Material Printer

Product Preview

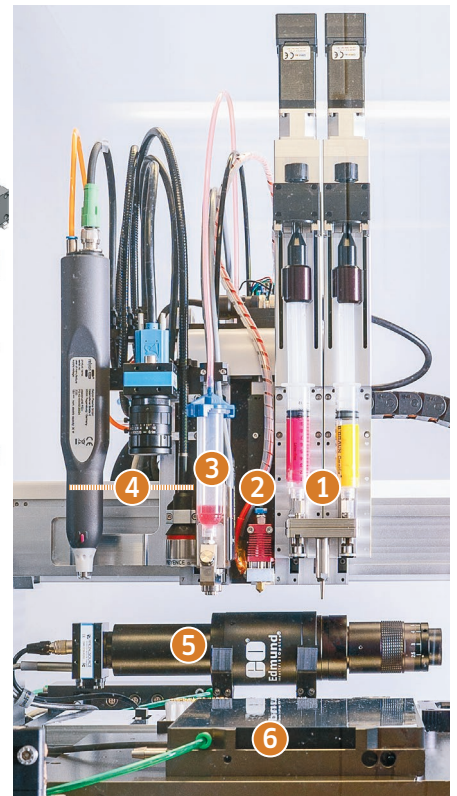
Extruders / dispensing tools

(Selection, see also BioScaffolder catalogue)

- Pneumatic extruders for single-use cartridges (1 to 50 ml) with Luer-Lock tips for viscous polymers, silicone, hydrogels or ceramic pastes
- Heatable (up to 190 °C) pneumatic extruders for GeSiM stainless steel cartridges and metal tips for volumes between 1.5 and 10 ml
- Piston-based cartridge dispensers, heatable (250 °C) and non-heatable
- 2-channel piston-based extruders (heatable / non-heatable) with static mixer for gradients with defined mixing ratios
- FDM print head for filaments with diameters 1.75 or 2.85 mm
- 'Drop-on-demand' print heads (piezoelectrically or solenoid-valve-driven) for low and high-viscosity inks based on silver, carbon or graphene, at RT or up to 100 °C
- Wiper nozzle, pick & place tool
- Screw-based progressive cavity pump for smooth paste printing (PureDyne by ViscoTec)



Example of a tool head configuration: 1 piston extruders with gradient mixer; 2 FDM head with filament on a roll; 3 piezo valve dispenser + UV pen; 4 multi-tool Z-axis with plasma pen, camera, IR lamp for heating (not visible), thickness sensor; 5 stroboscope camera, 6 levelling table / substrate holder

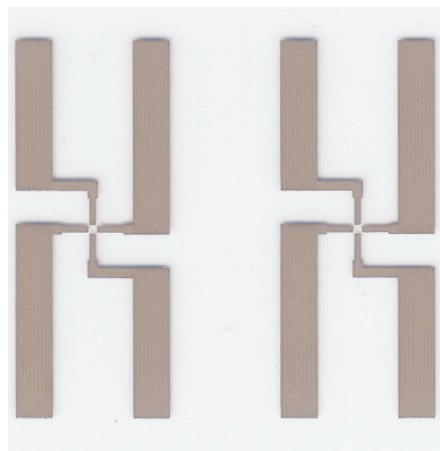


Measuring /service tools

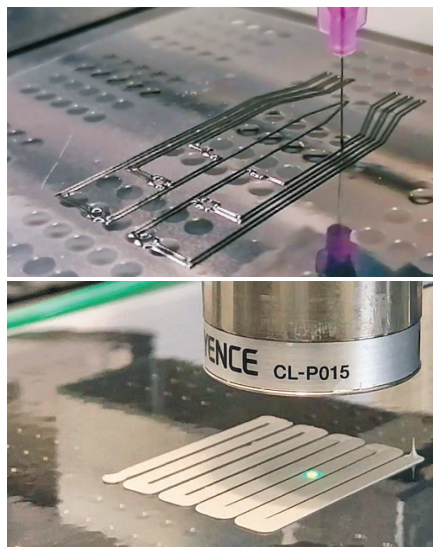
- Thickness measurement probe (Keyence)
- Plasma pen for surface cleaning and/or gas phase deposition of thin films (Relyon)
- Cameras for surveillance and documentation

For more tools see the other GeSiM brochures and catalogues.

Watch the latest videos here:



Two microelectrodes for dielectrophoresis experiments, printed with a piezoelectric pipette. The water-based silver ink, NovaCentrix Metalon, was spotted on Novele PET foil and photo-cured. Its centre is a quadrupole; the outer areas are contact pads.



Printing of conducting polymer on a hot plate (top) and optical layer thickness measurement (bottom)

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