



## E-NANOPRINT-PRO: ELECTROHYDRODYNAMIC TECHNOLOGY BRINGS PRINTING ON NANOSCALE WITHIN REACH

Printing conductive wires with nanometer dimensions! A platform for printing wires on a nanometer scale with electrohydrodynamic technology has been developed. Applications are in various fields, such as displays, micro fluidics, batteries and photo voltaics. The new DM50-ENP Electrohydrodynamic Nanowire Printer is available for research laboratories with programs on the deposition of advanced materials.

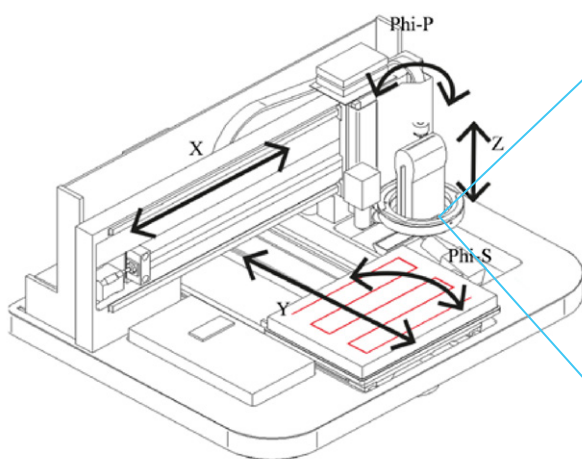


Fig. 1: System set-up

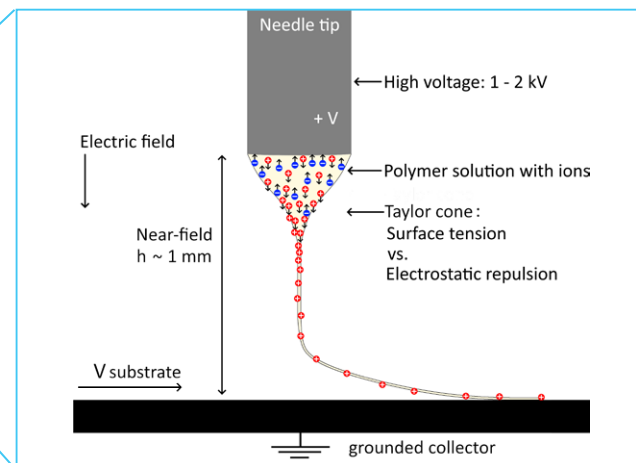


Fig. 2: Electrospinning working principle

### SMALLER IS BETTER

It is well known that electronic products, such as chips, are being made with ever smaller dimensions for offering ever more performance. A similar drive to go smaller exists in the printer industry. This includes the area of printed electronics. It is possible to print electronic structures on flexible substrates. As in conventional electronics, making such structures with smaller sizes brings better products.

This is why DoMicro has developed a printer with a novel technology for printing wires with nanoscale dimensions. The printer is based on the

electrohydrodynamic effect. This effect enables a submicron additive technology, in which an electric field is used for pulling an inkjet into a very narrow shape. The effect can reduce the line width from about 30 microns, as can be obtained with industrial inkjet technology, down to 1 micron or less.

The printer was developed and tested with the German partners microTEC and Coatema and the Dutch partners DoMicro, tec-V and TechToBizz in the E-Nanoprint-Pro project within the scope of the RockET Reloaded program.



## APPLICATIONS AND OUTLOOK

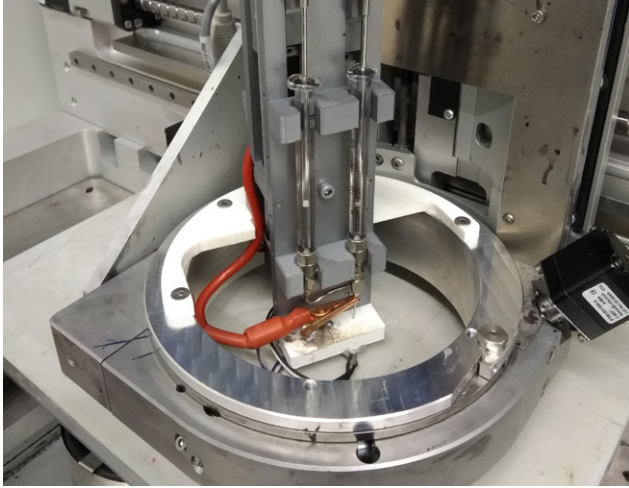


Fig. 3: Nanowire printhead prototype by DoMicro (on x-y-z stage)

A key application is in the deposition of metal meshes with sustainable materials for the high-tech industry. With nanowire printing, transparent electrodes can be offered for replacing Indium Tin Oxide (ITO). This eliminates the need for Indium, a scarce and expensive material. A metal mesh with such transparent electrodes needs to offer a high conductivity and optical clarity while allowing an environmentally friendly manufacturing process. It should be compatible for large transparent conductive films.

For this application the printer must be suitable for industrial environments. Within the E-Nanoprint-Pro project, the new printer prototype has been tested on a continuous coating machine at Coatema. The trials were successful and showed that the new printing technology can be scaled up for industrial environments.



Fig. 4: Zigzag pattern on Cu substrate in continuous coating machine

A second application, investigated within the E-Nanoprint-Pro project, is the miniaturization of microfluidic devices by using nanowires. This application was studied in a cooperation with microTEC, with a focus on a health care device which is sufficiently small for placement inside the body.

Next to the two applications mentioned above, many other interesting applications in printed electronics are emerging for printed nanowires in batteries, photovoltaics, displays, microfluidics, electronics and biochips with components such as filters, membranes, touchscreens, micropumps and MEMS. The DM50-ENP is available for enabling research in these fields.



## DOMICRO COMPANY PROFILE



DoMicro BV is a technology company providing innovative manufacturing technology, application solutions and micro assembly technology for flexible hybrid electronics (FHE) and micro devices. DoMicro excels in developing cutting edge inkjet printing processes, micro assembly and 3D packaging technology.

If you are challenged by the market and looking for a partner to move your ideas into realization, contact us.

We really do **IMAGINE, CREATE and ACCOMPLISH.**