3D printed stainless steel microelectrode arrays

Dr. Robert Christopher Roberts from the University of Hong Kong (HKU) has developed high-aspect-ratio stainless steel microelectrode arrays (MEA) printed on a DMP50 GP device. The paper, published in 2017, describes the procedure of printing this application by Micro Laser Sintering (MLS) with a 3D MicroPrint machine purchased by HKU in 2015. Furthermore, Dr. Roberts characterized the MEA regarding both the electrical and mechanical properties to show the capabilities of MLS technology and its future use in biomedical applications.

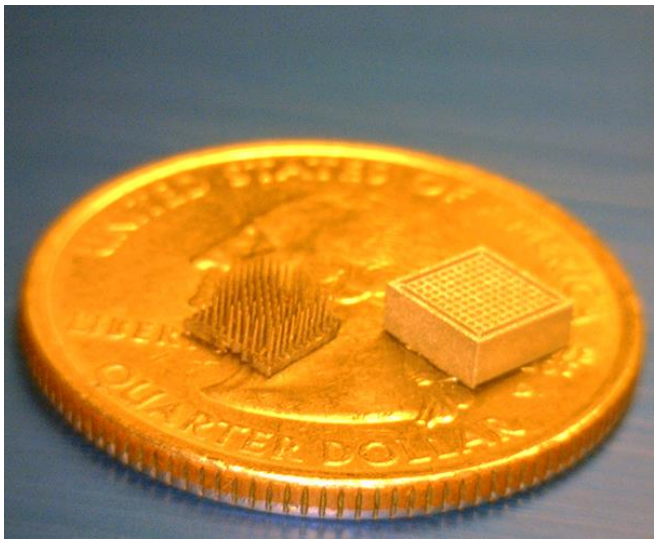

Figure 1 MEA and sacrificial support on a quarter Dollar coin

Dr. Roberts described the technique of producing 3D MEAs on a DMP50 GP tool with stainless steel (17-4PH and 316L). A DMP50 GP tool is a direct metal laser sintering (DMLS) tool specialized for structures in the µm range. This tool is running in an inert gas atmosphere with a typical oxygen content of < 1 ppm. The laser spot diameter is 30 µm and the vertical thickness of each powder layer is 5 µm. Due to the high aspect ratio and dimensions smaller than 100 µm at a height of 1.5 mm, the MEAs require a high-resolution process and a special support structure, both of which are described in the paper.

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Characteristics of the printed stainless steels including electrical conductivity, density and roughness haves been measured and compared versus different DMP50 GP process parameters like such as laser power and recoating speed.

The paper demonstrates the use of MLS technology impressively. It shows how a smart way of using an interlocking sacrificial structure can make things possible – in this case, it shows a 100 – element stainless steel microelectrode array for a future biomedical use. This work opens a new gateway for the future use of µSLM into micro-electronic and biomedical applications.

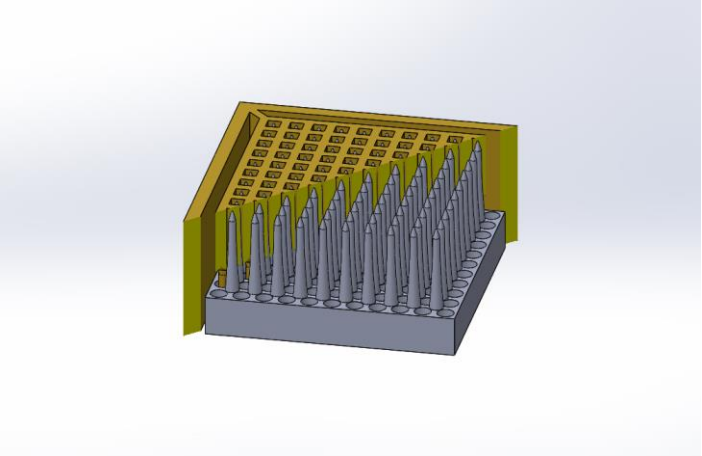

Figure 2 CAD of the full structure

Get the full paper here:

http://ieeexplore.ieee.org/document/7994278/

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About 3D MicroPrint GmbH

3D MicroPrint GmbH is known for high-precision micro parts manufactured by Micro Laser Sintering. Since the company was founded in 2013 by EOS GmbH and 3D-Micromac AG, the additive manufacturing process has been further developed for micro parts and has been adapted to run an industrial production. Today we are providing our customers the entire portfolio of design consulting for additive manufacturing, feasibility studies and parts production up to their own 3D MicroPrint Micro Laser Sintering system. Furthermore 3D MicroPrint offers material developments for exclusive technologies on demand. The key applications for micro parts are medical industry, wearables, semiconductors and micro industries, high frequency applications as well as aerospace.

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