Equipment Development Center

IX-T Development of New Instruments and Experimental Devices

The technical staff of the Equipment Development Center is partly engaged in planning, researching, designing and constructing high technology experimental instruments in collaboration with the scientific staff. And these experimental instruments are incorporated with new manufacturing technology and new mechanical idea.

IX-T-1 Manufacture of a Mold for a Microchip Using a Surface Impression Agent

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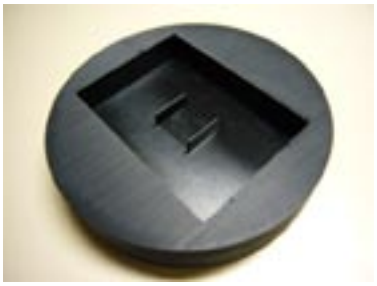
Figure 1 shows an external photograph and an SEM photograph of a produced mold. A microchip is produced by injecting PDMS into the mold. The mold has first projections of 0.5 mm in width and 3 mm in height on both sides which form liquid sump sections, and second projections extending between the first projections each having a width of 90 μm and a height 60 μm which form passages.

The mold cannot be produced by machinery because of tool interference. Therefore, a master die is produced first by machinery, and the produced master die is transferred to make an inverse shape. In general, the transferring step is performed using an electrocasting method. However, because the electrocasting method is expensive, the master die is transferred to the inverse shape using a surface impression agent (Heraeus Kulzer GmbH & Co. Technovit 3040), which is an easier method. With the method, the mold for a PDMS microchip is produced in a short time at low cost. A produced PDMS microchip is used for making protein stripes on plastic dishes or glass coverslips as substrates for neural cell culture.



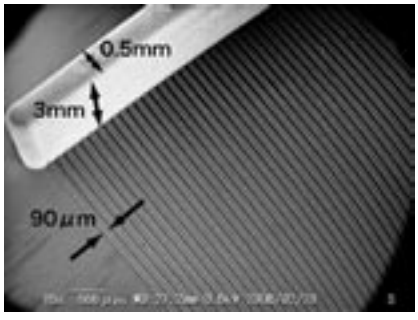


Figure 1. The externals and the SEM photographs of the mold.

IX-T-2 A Compact Mechanical Velocity Selector to Analyze Molecular Alignment

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We received a request on the production of disks from Professor Kasai. (Department of Chemistry Graduate School of Science, Osaka University). As a new attempt, we expand our service to the outside researchers of universities and research institutes since October 2005. We suggested the application of the wire-cut electrical discharge machining (WEDM) to manufacturing the fine disks. However, it was difficult to apply the conventional method as it is. Therefore, we devised and made supporting tools. And we examined a routine of the production process. Selector dimensions and technical data are shown in table 1. Schematical drawing of a disk of the mechanical velocity selector is shown in Figure 1. Magnified view of fine slits on the disk is also shown in Figure 2. We used a wire of 70 micron in diameter in the processing. The slit of 100 micron in width was obtained with it. Using this fine wire enables us to make a slit of 85 micron in the minimum width.

Table 1. Selector dimensions and technical data.

Number of disks	2
Diameter of disks	72mm
Number of slits per disk	720
Length of the slits	2mm
Slit with	0.1mm
Wall width between slits	0.2mm
Disk thickness	0.1mm
Material of disks	stainless steel

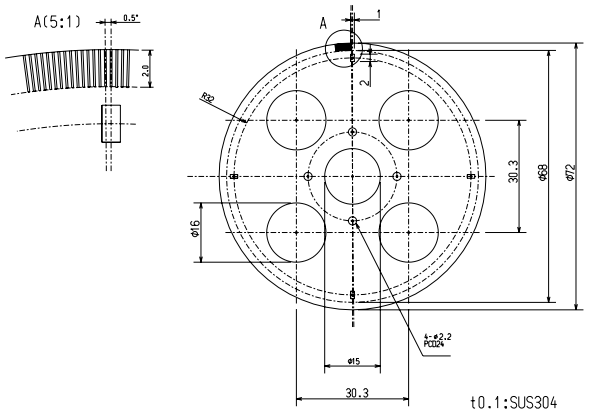

Figure 1. Schematical drawing of a disk of the mechanical velocity selector.

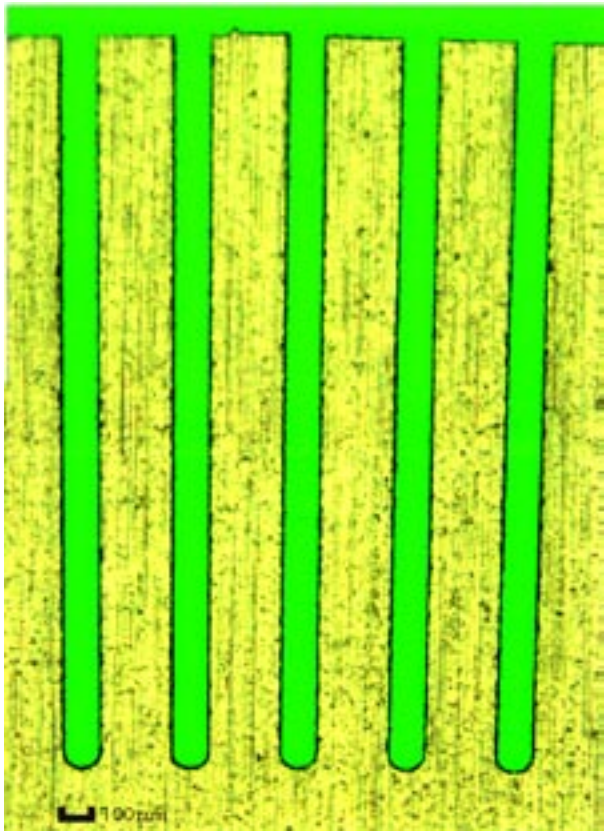

Figure 2. Photograph of the slit.