

Aisin Cosmos R&D Co., Ltd.

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1. Introduction

Aisin Cosmos R&D Co., Ltd. was founded in Kariya City in Aichi Prefecture in October 1992 as an R&D company under Aisin Seiki Co., Ltd. Since its establishment, the company has focused its energies on fields in which great strides are expected in the 21st century, such as biotechnology, micromachine technology, and medical equipment. In addition, we are developing technologies that may become feasible in the coming generations, such as an antigen-antibody reaction sensing technology using a technique for exhaustively analyzing genes and the surface plasmon resonance principle, and microfluid devices such as micropumps and microsorters.

In today's information society, which is experiencing rapid growth in technology, we are concerned with people's health and destruction of the environment. In our research, we are striving to link our developed technologies to devices that can provide security and peace of mind to the average citizen.

2. Endeavors in Micromachine Technology

Our endeavors in micromachine technology began in 1990, inspired by a micromotor having a diameter of 100 μm that first emerged around 1989, drawing much attention. However, in terms of the scaling, heat and viscosity become more dominant in micromachine functions than in conventional designs. Therefore, we made it a point to begin developing micropumps comprising heat actuators. We also participated in the former Micromachine Project organized by METI (formerly MITI), at which time we conducted R&D focusing on microfluid control technology in micro-region. We are currently focusing on using our developed technologies in the biotechnology field.

Fig. 1 shows a photo of a micro cell sorter developed using our microfluid control technology. In this device, cells are entrapped in droplets that are formed in the channel, with prescribed cells being made fluorescent to aid in sorting and separation. By performing everything from droplet formation to

sorting and separation within the channels, the system is airtight and should prevent contamination and improve operability. Currently we have achieved a droplet formation/separation rate of 5,000 droplets/second in experiments that entrap fluorescent beads in the droplets.

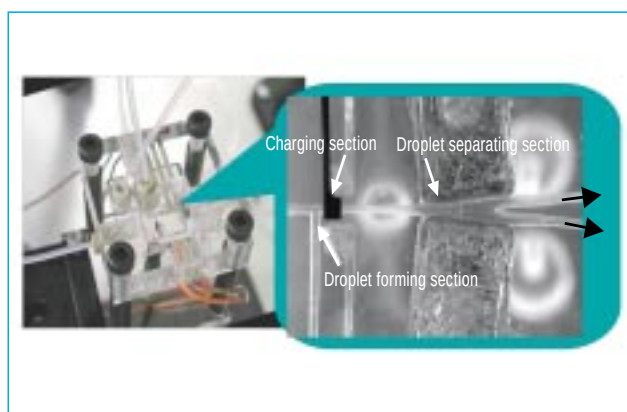
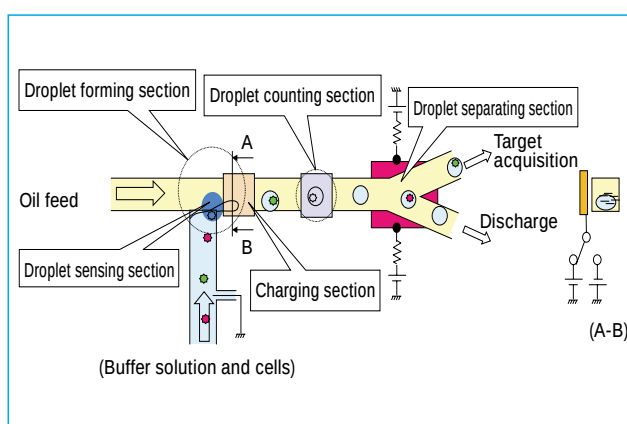


Fig. 1 Photo of a microsorter with an enlarged view of the sorter section

3. Future Prospects for Micromachine Technology

For the past ten years or more, micromachine technology has developed significantly in the fields of MEMS and μTAS . While MEMS has shown steady progress toward practical use in the fields of information and sensors, it is thought that μTAS , based on micromachine technology, must be somehow matched with biotechnology or chemical technology on a nanotechnology base to achieve practical applications.