

Capillary-Assembled Microchip: Towards the Developments of Multi-Functional Biomedical Chips for Next Generation

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“Capillary-Assembled Microchip (CAs-CHIP)” is fabricated by embedding the chemically-functionalized square capillaries into lattice PDMS channel having same channel dimensions as the outer dimensions of square capillaries. This new approach of chip fabrication allowed us not only the integration of various chemical functions, but also that of multiphase flow process onto a single microfluidic device (H.Hisamoto et al., *Anal. Chem.* 2004, 76, 3222.). Therefore, CAs-CHIP technology has a great potential for the fabrication of multi-functional microfluidic device, which have been very difficult to fabricate using standard microfabrication technology.

In order to apply CAs-CHIP technology for the development of novel biomedical analysis chips, we have been investigating the development of various chemical sensing and electrophoretic separation systems (H.Hisamoto et al., *Anal. Chem.* 2005, 77, 2266.; *Anal. Chim. Acta* 2005 in press.; *Anal. Bioanal. Chem.* 2006 submitted.).

Here, following topics will be presented at the symposium.

1) General concept of CAs-CHIP

2) Fabrication of CAs-CHIP

3) Application of the CAs-CHIP for various analytical systems

3-1) Multi-ion sensing based on various ion-sensing membrane-immobilized capillaries

3-2) Valving and sensing based on thermo-responsive polymer-immobilized capillaries and

biomolecule-immobilized capillaries

3-3) Enzyme activity sensing based on substrate-containing dissolvable membrane-immobilized capillaries