

Microfluidic chip for biomolecular analysis and separation

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In this presentation, two microfluidic devices for biomolecular separation/analysis will be covered. First, a sample preparation microdevice for the controlled immobilization and patterning of enzymes and antibodies with a polymer-modified temperature-addressable microelectrode will be described. A heat-sensitive poly(isopropyl acrylamide) polymer, which shows highly reversible transition of its conformation in response to temperature changes, was employed in the integrated microfluidic device. Based on the steric hindrance caused by the structural transition of the heat-sensitive polymer, the accessibility of biomolecules to the interface could be modulated, resulting in controlled immobilization and patterning. Next, a polymer microfluidic chip for sample exchange via natural capillary force and a test of the device for biochemical reaction will be described. The device in this study was designed in such a way that the sample replacement in the reaction chamber would be accomplished by capillary force only. For the application of the device in biochemical analysis, enzyme catalyzed precipitation and fluorescence tagging reactions were tested.