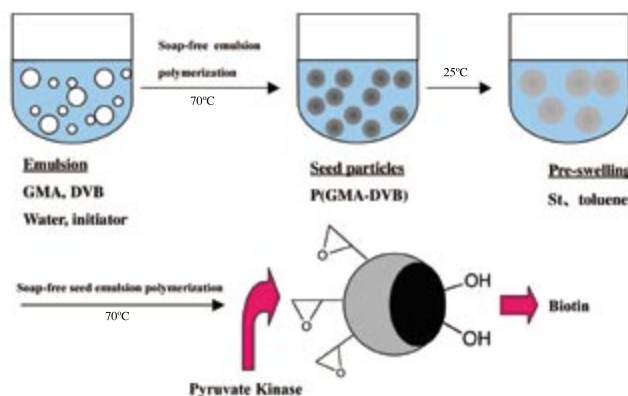


## Biotinylated and Enzyme Immobilized Hetero-bifunctional Latex Beads

A novel biotinylated and enzyme immobilized nano-bio element was first prepared by using hetero-bifunctional poly(glycidyl methacrylate-*co*-divinylbenzene)/polystyrene (P(GMA-DVB)/PSt) composite latex beads (Scheme). 5-(*n*-succinimidyl)oxycarbonyl) pentyl *d*-biotinamide (Biotin-X-NHS) was firstly reacted with the hydroxyl group on polystyrene domain of latex beads. Pyruvate kinase was then directly immobilized to the biotinylated latex beads through the epoxy groups of latex bead surface. The concentration of pyruvate was monitored spectrophotometrically, to obtain maximum velocity ( $V_{max}$ ) and Michaelis constant ( $K_M$ ) of

covalently immobilized pyruvate kinase. The enzyme activity was roughly half of the free one when the concentration of substrates was 100  $\mu$ M, which remained almost unchanged even after stored at 4  $^{\circ}$ C for 48 days.



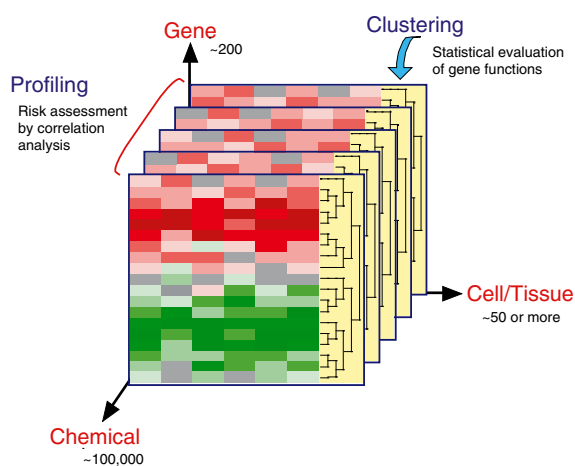
Scheme. Preparation procedure of biotinylated and enzyme immobilized latex beads

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## Development of DNA Microarrays for Evaluation of Estrogen Activity

We developed DNA microarrays for evaluation of estrogen activity by using human genes which are responsive to estrogen, a female hormone. A total of 203 genes were spotted on a microarray and mRNA from cells of various tissue origins was used for monitoring changes in gene expression before and after treatment of the cells with estrogen or chemicals suspected to have estrogen activity. We will apply this technology for evaluation of endocrine disruptors, screening supplements and medicines, therapeutics and others.



Profiling of gene expression and clustering of estrogen responses after treatment of cells with various chemicals for application of DNA microarray data for risk assessment or gene function analysis. Changes in the expression level of genes are indicated as red (for up-regulation) or green (for down-regulation) tiles.

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