Reference

[1] Yoo SM, Kang M, Kang T, Kim DM, Lee SY, Kim B. *Nano Lett* 2013;**13**(6):2431–5.

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PQ-07

Nano-pattern integrated biomimetic system for wound healing assay

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Wound healing process of damaged skin involves various steps of cellular behavior and complex combinations of signaling pathway. In this research, we simply fabricated nano-patterned surfaces with biocompatible PDMS (Polydimethylsiloxane) polymer and integrated a patterned surface with a microfluidic system which can mimic wound healing rad processes. To form wound damage to 3T3 fibroblast cell layer cultured on the surface, we generated layered flows of cell culture media and trypsin/EDTA in a microchannel. We monitored cell migration on the pattern during wound healing process and found that the patterned surface guided the migration of cells as well as the intercellular cytoskeleton structure. The results demonstrate that cellular behavior can be controlled for wound healing by mechanical stimuli. We expect that the developed 2D skin model can be integrated with various types of surface and used as a standard assay platform for wound healing research.

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PQ-08

Water purification through cross-linked proteoliposomes using a preconcentrator

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Aquaporin is the most efficient filter in nature due to its high water selectivity and permeability. However, the manufactural difficulties of efficient and large scaled aquaporin embedded membrane preclude its industrial applications. It is mainly attributed to the fragility of a lipid bilayer or other biomimetic membrane. We have created robust membranes by cross-linking liposomes with linkers. In addition, we concentrated liposomes effectively using a microfluidic preconcentrator which has nanochannels formed by the electrical breakdown of a polydimethylsiloxane (PDMS) membrane at a high electrical bias with no nano-lithography. Proteoliposomes were continuously concentrated at the target position by applying an electric field through the junction of micro- and nanochannels. Amine-terminated proteoliposomes embedded with aquaporin were conjugated to the surface of the PDMS device via EDC/NHS reaction. As a result, the durability of proteoliposome was increased to withstand up to ~9 atm and water purification was demonstrated using our device.

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PQ-09

A comparative study of the effectiveness of β-glucosidase immobilized on CNT-nanoparticles and Ca-alginate beads

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Enzymes are extensively used in various industrial, biomedical and biopharmaceutical applications. However, enzymes in their free form are unstable and expensive besides being characteristically susceptible to inhibition by high product concentrations and are highly sensitive to pH and temperature changes. Immobilization technology offers solutions to these challenges besides enhancing operational stability, longevity and ease of separation. β-Glucosidase has been widely employed as model enzyme for enzymatic studies. Ca-alginate beads provide a gentle environment for immobilization, but have certain limitations such as low stability, high porosity and limitations in biocompatibility. Carbon nanotubes (CNTs) on the other hand have excellent mechanical, thermal and electrical properties, as well as dimensional and chemical compatibility with biomolecules like DNA and enzymes, suitable for biosensor design. Here, β-glucosidase was immobilized in Ca-alginate gel and multiwalled carbon nanotubes (MWCNT) using standard techniques and their activity was compared with that of free enzyme. The activity was found highest (12.53 U/mL) for the free enzyme and lowest (9.768 U/mL) for the immobilized Ca-alginate. The activity of immobilized MWCNT (12.20 U/mL) was close to the free enzyme activity. The enzyme reaction was found to follow Michaelis–Menten kinetics. The Michaelis constants, K_m and V_{max}, determined using Langmuir linearized plots are, respectively, 0.09048 μmol/mL and 0.00989 μmol/mL min for immobilized Ca-alginate; and 0.0985 μmol/mL and 0.01237 μmol/mL min for immobilized MWCNT. The corresponding values for the free enzyme are 0.0854 μmol/mL and 0.01263 μmol/mL min. Thus, the MWCNT appears to be a promising support material for enzyme immobilization.

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