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Fabrication of a PDMS thin film with surface modification as a scaffold for animal cells

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Polydimethylsiloxane (PDMS) is an appropriate material as a scaffold to be applied to human body due to its characteristics of biocompatibility, transparency and flexibility. Here, PDMS film was fabricated by spin-coating and the thickness of the film was reduced by diluting PDMS solution with hexane to make films easier to be applied to human body by reducing the volume of substrate. By using 40 times of hexane to PDMS solution, the thickness of the film was reduced from 5 μm to 420 nm. However, the hydrophobicity of PDMS film made it difficult for cells to attach and grow on the polymer surface. To solve this problem, the hydrophobic surface was treated by two methods, 3-chloropropyltriethoxysilane (CPTES) coating and Hydrochloric Acid (HCl) coating after corona treatment. Bovine satellite cells were cultivated on the PDMS film to check the effectiveness of the film as a substrate for the growth of cells. In this experiment, widely used plastic cell plate was selected as control which cannot act as a substrate. The cell growth on the HCl-coated PDMS films showed 65% of effectiveness compared to that of control plate when the number of cells were measured after 72 hours of seeding and that of CPTES-coated PDMS films showed maximum 43% of effectiveness, which was slightly different by concentration of CPTES. Although the surface-modified PDMS thin films showed lower effectiveness than control plate, these results demonstrate the potential of CPTES-treated and HCl-treated nanoscale thin PDMS film as a substrate for the growth of animal cells.

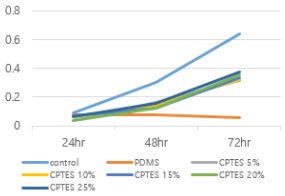

Figure 1. Absorbance value of 3-chloropropyltriethoxysilane (CPTES)-coated PDMS film measured by cell counting kit-8

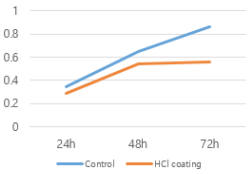

Figure 2. Absorbance value of hydrochloric acid (HCl) -coated PDMS film measured by cell counting kit-8

Biography

Ayoung Choi has completed her Bachelor's degree in the Department of Chemical and Biomolecular Engineering at Korea Advanced Institute of Science and Technology, South Korea. She is pursuing her Master's degree course in the Department of Chemical and Biomolecular Engineering from the same university. Her research work is on developing various kinds of scaffolds which are applicable to human bodies for medical purposes such as tissue scaffolds and artificial skin. She is interested in the field of tissue engineering and focuses on improving the variety and quality of scaffolds.

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