Document details

Back to results | Previous 2 of 23 Next

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Surface modification of Polycaprolactone (PCL) microcarrier for performance improvement of human skin fibroblast cell culture (Conference Paper) (Open Access)

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Abstract

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Polycaprolactone (PCL) has many advantages for use in biomedical engineering field. In the present work PCL microcarriers of 150-200 μm were fabricated using oil-in-water (o/w) emulsification coupled with solvent evaporation method. The surface charge of PCL microcarrier was then been improved by using ultraviolet/ozone treatment to introduce oxygen functional group. Immobilisation of gelatin onto PCL microspheres using zero-length crosslinker provides a stable protein-support complex, with no diffusional barrier which is ideal for mass processing. The optimum concentration of carboxyl group (COOH) absorbed on the surface was 1495.9 nmol/g and the amount of gelatin immobilized was 1797.3 μg/g on UV/O_3 treated microcarriers as compared to the untreated (320 μg/g) microcarriers. The absorption of functional oxygen groups on the surface and the immobilized gelatin was confirmed with Fourier Transformed Infrared spectroscopy and the enhancement of hydrophilicity of the surface was confirmed using water contact angle measurement which decreased (86.93° - 49.34°) after UV/O_3 treatment and subsequently after immobilisation of gelatin. The attachment and growth kinetics for human skin fibroblast cell (HSFC) showed that adhesion occurred much more rapidly for gelatin immobilised surface as compared to untreated PCL and UV/O_3 PCL microcarrier.

Indexed keywords

Engineering controlled terms: Biomedical engineering, Cell culture, Emulsification, Fibroblasts, Growth kinetics, Hydrophilicity, Infrared spectroscopy, Laser tissue interaction, Manufacture, Surface treatment, Water absorption

Compendex keywords: Fourier transformed infrared spectroscopy, Human skin fibroblast, Optimum concentration, Oxygen functional groups, Performance improvements, Solvent evaporation method, UV/O3 treatment, Water contact angle measurement

Engineering main heading: Polycaprolactone

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PRGS 11-001-0001	Ministry of Higher Education, Malaysia	MOHE	See opportunities by MOHE
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