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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 $\mu\text{g/g}$ on UV/O₃ treated microcarriers as compared to the untreated (320 $\mu\text{g/g}$) 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/O₃ 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/O₃ PCL microcarrier. © Published under licence by IOP Publishing Ltd.

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

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