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Surface modification of microcporous of polycaprolactone (PCL) microcarrier to improve microcarrier biocompatibility (Article)

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Abstract

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Oil/water emulsion solvent evaporation method was employed to fabricate polycaprolactone (PCL) microcarriers. In order to produce porous microcarrier, the method was slightly modified. The porous network channels were generated inside the microcarrier by introducing camphene that was dissolved in the same solvent used to dissolve raw PCL. The evaporation of solvent and sublimination of camphene during the process of emulsion solvent evaporation method, produce solidified porous microcarrier beads. The surface porous microcarriers beads were further modified to make it competent for cell attachment and proliferation. The surface of these microcarriers were modified with UV/O_3 system to introduce functional group and charge on the surface. The treatment followed with the immobilization of halal gelatin on the surface to imorove the biocompatibility of the microcarrier. Porous microcarrier with optimal size distribution was successfully fabricated. The average pore size of 11.74±8.32 μm was obtained with the concentration of 20% (w/v) of camphene. The porous PCL microcarrier was further tailored with gelatin through surface treatment with UV/O_3 system and gelatin immobilization and validation of its compatibility towards mammalian cell was tested with cultivation of green monkyer kidney cell (Vero) in the suspension culture. Vero cells attach and proliferatie well on the gelatin coated porous PCL microcarrier with maximum cell number of 3.90×10^5 cells/ml as compared to cell proliferation on UV/O_3 treated porous PCL microcarrier (1.83×10^5 cells/ml). The developed microcarrier may be potentially applicable as a cell delivery scaffold for cell tissue culture and tissue engineering application. © 2018, Insight Society.

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