

Statistical optimization of gelatin immobilisation on modified surface PCL microcarrier to improve PCL microcarrier compatibility

ABSTRACT

Growing cells on microcarriers may have overcome the limitation of conventional cell culture system. However, the main challenge remains at ensuring the surface biocompatibility with cells. Polycaprolactone (PCL), a biodegradable polymer, has received considerable attention because of its excellent mechanical properties and degradation kinetics that suit various applications, but its non-polar hydrocarbon moiety renders it sub-optimal for cell attachment. In this present study, the aim was to improve biocompatibility of PCL microcarrier by introducing oxygen functional group via ultraviolet irradiation and ozone aeration (UV/O₃ system) to allow covalent immobilization of gelatin on the PCL microcarrier surface. Respond surface methodology was used as a statistical approach to optimized parameters that effect the immobilization of gelatin. The parameters used to maximized amount of gelatin immobilize were the mol ratio of COOH:EDAC, NHS concentration and gelatin concentration. The optimum conditions for maximum amount of gelatin (1797.33 µg/g) on the surface of PCL were as follows: 1.5 of COOH:EDAC ratio, 10 mM NHS concentration and, 80 mg/ml gelatin. The result shows that gelatin coated PCL microcarrier promote more and rapid cell adhesion with density of as compared to raw PCL microcarrier (and UV/O₃ treated PCL microcarrier (. Therefore, immobilization of gelatin with optimized parameters onto PCL microcarrier improved biocompatibility of PCL microcarrier.

Keyword: Microcarrier; Gelatin immobilization; Polycaprolactone; Statistical optimization

