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Plasma surface treatment of PLA polymers by PECVD in tissue engineering

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In tissue engineering, cell adhesion is an important feature for biomaterial which can be achieved with surface treatment. Complex structures and scaffolds can be easily processed in tissue engineering and may induce the desired functional group on their surface with plasma.

In this research poly lactic acid (PLA) was used as the raw material. To improve its surface characteristics, such as cell adhesion, plasma enhanced chemical vapor deposition (PECVD) was used in the radio frequency mode. The hydrophilicity and roughness of the PLA films were investigated after nitrogen plasma processing. Hydrophobic recovery of the surface was investigated in two different environments, room temperature and temperature between 0-8. Adipose tissue stem cells were cultured on the samples. After 3day SEM was done to illustrate cell adhesion. Plasma diagnostic (optical emission spectroscopy) showed that N_2^+ and N_2 species have an important role in nitrogen plasma treatment. For the hydrophobic recovery test, samples kept in low temperature maintain hydrophilic property after 30 days. Plasma surface treatment improves cell adhesion relating to high wettability and roughness.

Keywords

Radio frequency plasma

PECVD

Cell adhesion

Wettability

Roughness