PLASMA MODIFICATION OF 3-D BIODEGRADABLE SCAFFOLDS TO IMPROVE SURFACE WETTABILITY

DINA SYROMOTINA[1], *ANDREI ZVIAGIN*[1], *ROMAN SURMENEV*[1], *MARIA SURMENEVA*[1] *AND CHRISTIAN OEHR*[2]

[1]*National Research Tomsk Polytechnic University, Russia*
[2]*Fraunhofer Institute for Interfacial Engineering and Biotechnology, Germany*
syromotinads@gmail.com

3-D biodegradable polymer scaffolds are promising in repair of different defect parts of injured bone. The 3-D scaffolds prepared by a method of electrospinning have a wide range of physical properties and high porosity to promote successful penetration of osteoblasts into the scaffolds. However, synthetic biodegradable polymers as polycaprolactone (PCL) are hydrophobic in nature that leads to poor surface wettability of 3-D scaffolds and impedes the penetration of cell into the interior structure. Poor wettability and cell adhesion as a result of poor migration and proliferation of osteoblasts can impede bone regeneration process.

Plasma treatment is one of the most perspective methods to improve surface wettability and biocompatibility of polymers [1]. Investigation of 3-D scaffolds wettability using measurements of water contact angle showed significant changes of scaffolds wettability depending on reactive gas. Untreated scaffolds are hydrophobic with contact angle in range of 130–140°. The minor changes of wettability were revealed in the case of 3-D scaffolds treated in argon (~ 100°) or ammonia plasma (~ 120°). An improvement of 3-D scaffolds wettability took place after they were undergone to treatment in oxygen plasma due to grafting of hydrophilic functional groups on the surface. Water droplets penetrated into the porous 3-D scaffolds for less than 2 seconds.

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