ATMOSPHERIC PRESSURE PLASMA TREATMENT OF POLYPROPYLENE NON-WOVEN TEXTILES FOR ATTACHMENT OF POLY(L-LACTIDE) NANOPARTICLES

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Abstract

In this work, we used atmospheric pressure plasma in ambient air generated by diffuse coplanar surface barrier discharge [1] to treat polypropylene non-woven textiles in order to increase their surface energy prior deposition of poly(L-lactide) nanoparticles containing antimicrobial agent octenidine, that can be released when nanoparticles are in contact with bacteria. Untreated textiles showed poor surface properties and distribution of particles was uneven and remained on the textile surface. Short plasma treatment time led to fast hydrophilization of the textiles and penetration of particles into textile volume. This work is mainly focus on the advantages of atmospheric plasma treatment technology, while antibacterial particles are described in our previous work [2]. We have investigated plasma treatment efficiency by means of strike-through-time measurements and linked these findings with XPS data of untreated and plasma treated surfaces. SEM showed that distribution of particles formed a crust on the untreated non-woven textiles surface, whereas plasma treatment textiles showed particles distributed evenly in the volume of treated material. Plasma had no damage influence on textiles which consist of thin fibres. We have demonstrated that the plasma system can be also integrated within roll-to-roll line and nanoparticles can be delivered on the textiles using ink jet printing.

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