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Low-temperature plasma modification of five-layer spunmelt medical materials

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Abstract

Among the problems associated with the production of nonwoven fabric and clothing from nonwoven fabrics, one of the most important and most urgent is the problem of studying the consumer characteristics of nonwoven fabrics of medical significance. The rapid development of the clothing market requires domestic manufacturers to create competitive products not only through new products and technologies, but also new sensations for the consumer, provided that the price is competitive. Plasma treatment is a fairly effective and promising method for modifying nonwoven materials. The main advantage of this type of material modification is the environmental friendliness of the method, since no aqueous solutions of chemicals are used during processing, as in the case of using special impregnations. In the process of this work, a 5-layer spunbond-meltblown-meltblown-meltblown-spunbond (SMMMS) nonwoven fabric with a surface density of 35 g/m^2 obtained on the basis of polypropylene was modified using a nonequilibrium low-temperature plasma. It is shown that after plasma treatment, a five-layer spunmelt material increases such consumer characteristics as air permeability, hygroscopicity, while maintaining strength during elongation; there is a decrease in the stiffness of materials in bending. It was also found that after treatment with a nonequilibrium low-temperature plasma, the rate of electrification increases, but in general, the values of electrification do not go beyond the limits established in GOST 12.1.045-84. Manufacturers can be recommended to treat materials like SMMMS with nonequilibrium low-temperature plasma in order to improve the consumer characteristics of the material. It is recommended to use argon as a plasma-forming gas with a flow rate of 1500 cm^3/min.

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