PROPERTIES OF NONWOVEN MICROFIBER MATERIALS BASED ON PLANT EXTRACTS PRODUCED BY ELECTROSPINNING

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Nonwoven fibrous materials (NFM), thanks to their unique structure and properties, such as high specific surface area, porous structure and the possibility of modification, are promising materials for a wide range of applications, especially in medicine and cosmetology. Their use for the manufacture of wound and cosmetic dressings, filters and other medical devices is the subject of active research and development. Of particular interest is the possibility of creating NFM containing functional groups, such as synthetic drugs or active substances of medicinal plants. This opens up new perspectives for the development of intelligent materials capable of not only protecting the wound or skin, but also promoting their healing and regeneration. This work presents the results of research on the vapor permeability and water absorption of NFM samples made by electrospinning from solutions of polyvinyl alcohol (PVA) containing extracts of medicinal plants. The electrospinning method is a relatively accessible and effective way to obtain nanoscale fibers. PVA was chosen as the polymer base due to its availability, ease of processing, non-toxicity and biocompatibility. These properties make PVA an ideal material for use in medical and cosmetic products.

For the study, NFM samples were made containing 10% by weight of PVA and extracts of medicinal plants, such as oak bark *Quercus robur L.*, blue gum *Eucalyptus globulus*, oregano *Origanum vulgare L.* and pot marigold *Caléndula*. These plants are known for their antiseptic, anti-inflammatory and wound-healing properties. The extracts of medicinal plants were prepared according to a special formulation, dry plant parts per boiling water (m/V): oak bark. (10 g per 100 ml); blue gum (10 g per 200 ml); oregano (10 g per 200 ml); pot marigold (5 g per 200 ml). To obtain an aqueous extract of medicinal plants, they were infused in a water bath at a temperature of about 95 °C, for 30 minutes, followed by cooling at room temperature. To remove mechanical impurities, the extracts were filtered through a filter paper. PVA solutions were prepared in a water bath for 40 minutes. The NFM samples were formed using a laboratory capillary-type setup. The electric field voltage was 30 kV, the distance between the electrodes was 17.5 cm, and the capillary diameter was 0.33 mm.The obtained test results are shown in Figure 1.

Medicinal plant	Electrical conductivity, S/m.	Nonwoven sample thickness, mm	Water vapor permeability of the nonwoven sample, mg/cm²·h	Water vapor permeability of the film, mg/cm²·h	Relative water vapor permeability, %
Oak bark	0,0394	0,15	1,843	0,3686	500
Blue gum	0,1216	0,07	1,4707	0,3465	424
Oregano	0,2072	0,07	2,9488	0,4239	696
Pot marigold	0,0587	0,11	1,843	0,4055	455

Fig. 1. Some properties of the resulting nonwoven materials

It was experimentally established that the vapor permeability value for NFM samples is greater than the vapor permeability value of the corresponding films by 400-700%. This indicates that NFM have a high ability to transmit water vapor, which is an important factor for ensuring comfort and skin breathing under the dressing.