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Applications of Low Pressure Plasma in High-tech Textiles

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The plasma treatment of fabrics has emerged an important technique over the past years as a textile finishing process for “high-tech” textiles including technical and medical textiles etc. to tailor surface properties. The main reason for the increasing interest is that industrially well-established surface finishing processes suffer considerably from environmental and societal demands. ^[1-2]

It was shown that the hydrophilicity can be improved by incorporation hydrophilic groups on the surface using non-polymer forming gases such as Ar, N₂, CO₂, O₂, air etc.^[3] The modification was found to be less permanent due to reorganization of the polar surfaces. Moreover, the wash permanency remains an unsolved problem. Therefore, it is required plasma coating in order to obtain a permanent and long time stable modification. We have developed wash permanent superhydrophilic plasma coatings using our industrial reactor for synthetic textiles such as polyester, aramid, polypropylene etc. The coatings are adhere well with the substrate surfaces and were tested by Martindale Tester. We have also proved that the coatings are stable against more than twenty five industrial washing cycles. Thus, superhydrophilic plasma nanocoatings have a great potential for high—tech textiles due to their mechanical stability, elasticity and flexibility, while leaving the fabric comfort and touch unaffected.

Moreover, the possibility of substituting plasma processes for the traditional waterproofing processes of fabrics was evaluated in this work. A good water repellent finishing could be obtained using silane plasma. Furthermore, a wash permanent superhydrophobic (contact angle >145°) and oleophobic (oil-repellency grade 7) coating was obtained by using a plasma pretreatment followed by a grafting with perflouracrylates. This coating has also an excellent washing stability (>50X/ 60°C).

Literatures:[1] Hossain, M.M., Hegemann, D., Herrmann, A.S., *Plasma Process. Polym.* 2006, 3, 299.; [2] Poll, H.U., Schreiter, S. *Melliand Textilberichte* 1998, 6, 466.; [3] Hossain, M.M., Hegemann, D., Herrmann A.S., Chabreck P., *J. Appl. Polym. Sci.* 2006, 102, 1452. ;

Keywords

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