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Abstrakt:

Surface modification of polypropylene with amphiphilic cyclodextrins

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Modifying textiles with cyclodextrins (CDs) in order to obtain different or new functionalities, e.g. addition or removal of odors, has been the subject of many studies the past yearse.g. i-ii. Traditionally, the grafting of CDs onto fabrics like polypropylene (PP) has required extensive use of time, harsh organic solvents and/or sophisticated equipmentiii-v thus impeding the overall production of the fabric as well as raising the costs.

Here, we present a new, simple, patented method to graft CDs onto PP without the use of extraordinary equipment or harsh organic solvents in large quantities. The method is based on the idea that a CD derivative with properties compatible with the PP surface, such as an amphiphilic CD with hydrocarbon side chains, would adhere to the surface of the PP. It has been suggested that these amphiphilic CDs could migrate into the surface of a hydrophobic polymer, like PP, when the temperature is above the T*g*-value, making a kind of semi covalent bondvi.

Our method is based on a one-step synthesis route of the amphiphilic CD followed by a kiss-and-roll appliance technique. This method has proven to change the appearance of the PP from hydrophobic to hydrophilic. The method produces PP cloths with stable, permanent, and even multilayers of amphiphilic CDs which has retained the high capacity of complex formation known from native CDs.

We expect that the method can be further developed into coating of other materials like cotton and steel making the field of application span from personal care to sportswear and first aid equipment.

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i B. Martel, M. Morcellet, D. Ruffin, F. Vinet, M. Weltrowski, *J Incl Phenom Macro*,**2002**, *44*, 439.

ii M. H. Lee, K. J. Yoon, S. W. Ko, *J Appl Polym Sci*,**2000**, *78*, 1986.

iii P. Le Thuaut, B. Martel, G. Crini, U. Maschke, X. Coqueret, M. Morcellet, *J App Polym Sci*,**2000**, *77*, 2118.

iv S. M. Gawish, S. R. Matthews, D. M. Wafa, F. Breidt, M. A. Bourham, *J App Polym Sci*,**2007**, *103*, 1900.

v A. Yahiaoui, T. L. O'Connell, D. L. Myers, I. Bolian, Charles Edward, in *US patent no. 6613703*, USA, **2003**.

vi H. J. Buschmann, D. Knittel, E. Schollmeyer, *J Incl Phenom Macro*,**2001**, *40*, 169.