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Tonetti C, J Chem Tech App 2018, Volume 2

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Biography

Tonetti C worked as researcher at CNR-ISMAC of Biella (National Research Council–Institute for Macromolecular Studies). Main research activities regards the development of innovative methods (like UPLC/ESI-MS) for animal hair fibers identification in textile products, the production of keratin nanofiber membranes and chitosan composite materials for air and water depuration and the study of new finishing processes (like antimicrobial finishing, nanoparticles). She worked also on projects regarding the eco-toxicological qualities of textile products.

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LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY APPLIED TO THE IDENTIFICATION AND QUANTIFICATION OF ANIMAL HAIR FIBERS IN TEXTILE PRODUCTS

In this work, liquid chromatography coupled with electrospray mass spectrometry (LC/ESI-MS) was applied to the identification and quantification of animal hair fibers in textile products. International producers of textiles in cashmere and other specialty fibers requires suitable analytical methods for the assessment of fiber composition to protect consumers and defend themselves from common frauds, especially when cheaper fibers like wool and yak are blended with expensive fibers like cashmere. The animal fibers identification by traditional microscopic methods is often subjective, depending largely on the expertise of operator. In this case, the greatest difficulty is to distinguish and quantify yak from cashmere fibers because their external morphology is very similar. LC/ESI-MS analysis was successfully used to discriminate wool, cashmere and yak in textile materials by a proteomic approach. Keratin extracted from animal fibers was digested by trypsin, and the proteolytic peptides were analyzed by LC/ESI-MS to identify peptide markers, specifically and univocally, linked to the species of origin of the fibers. Several suitable peptide markers were identified and validated by many analyses of, known and unknown, wool/cashmere/yak blends at various stages of manufacture (fibers, slivers, yarns, fabrics, and raw materials) and with different treatments (dyed, depigmented, bleached, finished forms), showing 100% specificity and 100% selectivity. Some peptides were also used for the quantification of the different species in mixed fibers by LC/ESI-MS. Validation experiments and blind tests confirmed their ability to act as very specific qualitative and quantitative markers. Limit of detection (LOD) was estimated to be 3% and the precision of the analysis was always very good. Finally, it was demonstrated that bleaching, dyeing and depigmentation did not affect significantly the qualitative and quantitative analysis. The proteomic method based on LC/ESI-MS has become an international standard named “ISO 20418-1 Textiles - Qualitative and quantitative proteomic analysis of some animal hair fibres Part 1: Peptide detection using LC-ESI-MS with protein reduction”.

Note: