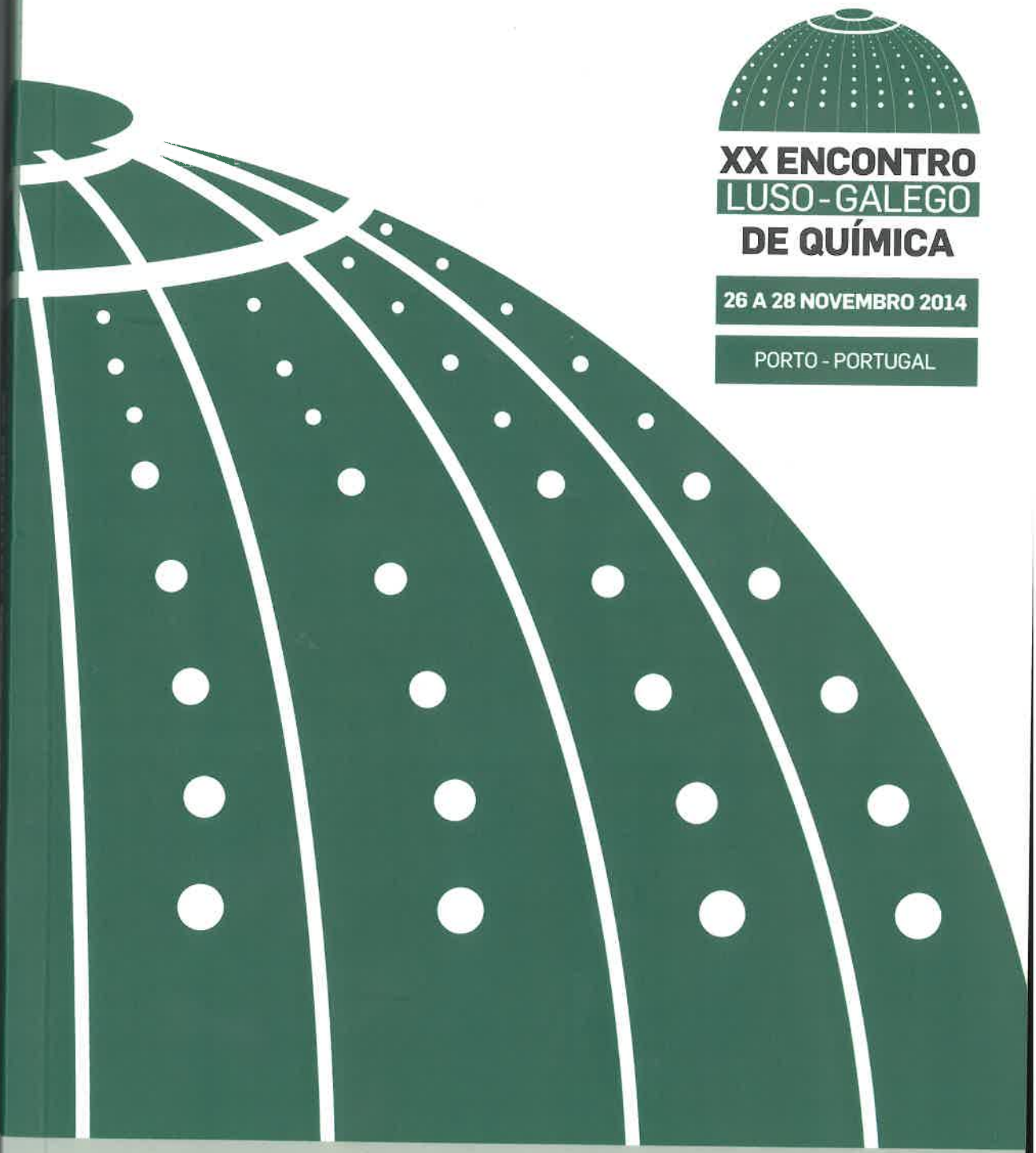

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Materials, components and technology for the footwear of the future – Newalk project

Isabel Fernandes[1], Mariana Barbosa[1], Joana Amaral[2], Vera Pinto[3], Maria José Ferreira[3], M. Filomena Barreiro[1]*

(1) LSRE, Associate Laboratory LSRE/LCM, Polytechnic Institute of Bragança, Campus Sta. Apolónia Ap. 1134, 5301-857, Bragança, Portugal

(2) REQUIMTE, Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, Rua Jorge Viterbo Ferreira, 228, 4050-31, Porto, Portugal and ESTiG/Polytechnic Institute of Bragança, Campus Sta. Apolónia Ap. 1134, 5301-857, Bragança, Portugal

(3) CTCP, Portuguese Footwear Technological Centrer, Rua de Fundões - Devesa Velha, 3700-121 S. João da Madeira, Portugal

*barreiro@ipb.pt

At present, footwear is considered as one of the most internationalized sectors of the Portuguese industry with a significant importance for the national economy, as it is proved by the economic data of 2012: the average annual production was 74 million of shoe pares, being 90.0% of the production exported, which represents an average value of 1610 million euros [1]. Moreover, the footwear sector seeks to affirm itself in market niches with greater technical and scientific requirement, value-added and high quality standards, resulting in research and technological development investment. An example of this tendency is the project Newalk whose main goal is the development of new materials, components and technology.

The intervention of our research group in the Newalk project had as main objectives the development of: (i) new materials (Newalk Mat); (ii) methodologies and innovative quality control systems (Newalk Qual); and (iii) footwear for comfort, health and wellbeing (Newalk Life). The activities included the development of: (i) thermoplastic polyurethanes (TPU) with improved biodegradability for shoe soles applications; (ii) methodologies for testing polyurethanes biodegradability; and (iii) polyurethane foams for shoe insoles with ability to reduce plantar pressure and impact.

In what concerns the biodegradable TPUs development, the best results were obtained by compounding with biobased additives. Among the tested additives, lignin gave rise the most promising results. Considering PU biodegradation analysis, two biodegradation methodologies were tested: in soil and in agar plates using different microorganisms. Additionally, a respirometry prototype system with continuous monitoring of the evolved CO_2 by conductivity was implemented and optimized. Finally, the flexible PU foams with best impact absorption properties were produced by modification with lignin-based reactive fillers.

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