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In the pathway to a biobased and circular approach to (furanic) polyesters

AUTHORS
Andreia F. SOUSA / CICECO AND CHEMISTRY DEPARTMENT, UNIVERSITY OF AVE, CICECO COMPLEXO DE LABORATÓRIOS TECNOLÓGICOS CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO

PURPOSE OF THE ABSTRACT
Due to their unique set of properties, polymers have quickly become irreplaceable and valuable materials to our society. In particular their malleabilility, durability and lightness together with competitive production costs have allowed them to be (almost) irreplaceble materials for a wide variety of uses spanning from simple and low value packaging to high added value cutting edge technological applications! However, in more recent years, polymers' status has been deeply questioned due to their fossil-based origin and non-circular fate after use.
In this context, our group has turned to the exploitation of biomass derived key building-block chemicals such as, for example, the 2,5-furandicarboxylic acid (FDCA), in polymer synthesis (1). The initial focus was on the synthesis and characterisation of poly(ethylene 2,5-furandicarboxylate) (PEF), the so-called renewable counterpart of poly(ethylene terephthalate) (PET). Afterward, motivated by the quest for adequate polymers' fate we introduce a new leitmotif in the furan polymers development ? the (bio)degradable furanic-aliphatic copolyesters, for instance the copolyesters based on PEF and PLA (2). Then, we extended the concept to homopolymers with poly(1,20-eicosanediyl 2,5-furandicarboxylate) which has interest among food packaging applications (equilibrium moisture uptake very near 0% due to its hydrophobic character but biodegraded) (2). More recently, our focus turned into furan-based polyesters recycling, combining the potential of deep eutectic solvents (DES) as innovative and potentially greener catalysts for glycolysis, and also approaching its dual capacity to also catalyze polyesterification reactions in a continuous closed-loop recycling method directly yielding the starting polymer. The whole-value chain of furans has attracted EU funding through the COST Action FUR4Sustain (CA18220) (Figure 1).

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FIGURES

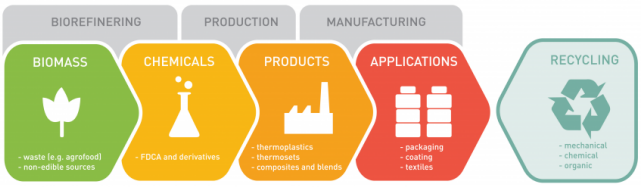

FIGURE 1

CA18220

Overview on furans' whole value chain and FUR4Sustain COST Action (CA18220) objectives.

FIGURE 2

KEYWORDS

furan-based polymers synthesis | recycling

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