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Synthesis and enzymatic polycondensation of new diol ?diamide monomers from microalgaes

AUTHORS
Meimoun JULIE / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Philippe ZINCK / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Audrey FAVRELLE / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Yann BERNHARD / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Till BOUSQUET / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Lydie PELINSKI / UNIVERSITÉ DE LILLE, CITÉ SCIENTIFIQUE, UCCS, VILLENEUVE D'ASCQ
Sylvain PELLEGRINI / UNIVERSITÉ DE LILLE, CITÉ SCEINTIFIQUE, UCCS, VILLENEUVE D'ASCQ

PURPOSE OF THE ABSTRACT

Research toward bio-based and biodegradable polymers has received a lot of attention these last years, due to environmental concerns and the need to replace fossil resources. In this context, the European Interreg ALPO project aims to develop new polymeric materials from microalgaes. Indeed, the microalgaes are a green renewable plant biomass with a great potential to access into valuable chemical starting molecules to synthesize new polymers.
A library of aliphatic diol-diamides was synthesized in the project in three steps from levulinic acid, a building block easily accessible from microalgaes [1]. Then the polycondensation of these new monomers with diacids / diesters was performed to obtain new bio-based poly(ester-amide).

The first experiments conducted using metal based catalysts (T>200°C) in bulk were found to lead to a cleavage of the polymer's repeating unit.
The use of lipases for the syntheses of classical polyesters is known in the literature [2,3]. Non-toxic and eco-friendly catalysis with enzymes was found to be an alternative allowing to avoid this problem since the reaction could be performed in solution at low T (<90°C).
We present herein the syntheses of the monomers from levulinic acid, their polymerization.to poly(ester-amide)s and the thermal, structural characterizations of these new poly(ester-amide)s.

FIGURES

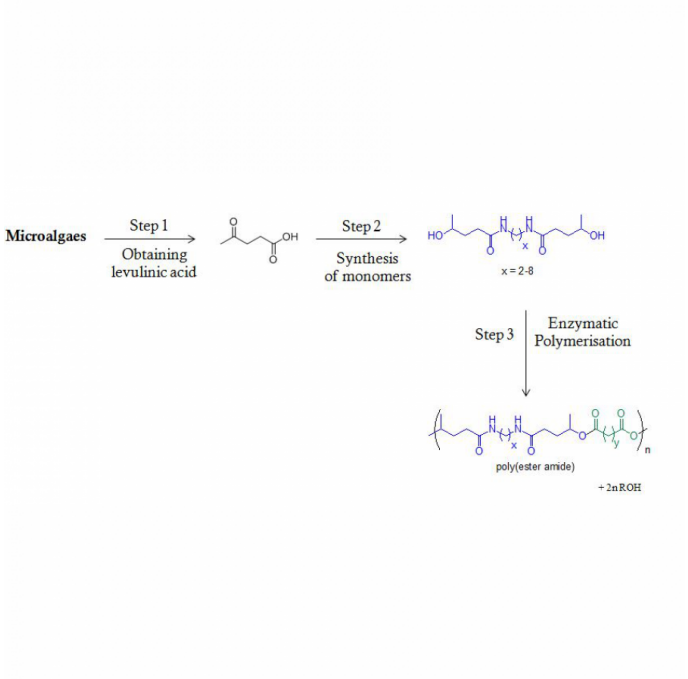

FIGURE 1

The different steps of ALPO project

The synthesis of monomers from levulinic acid and then their polymerization

FIGURE 2

KEYWORDS

microalgaes | enzymatic polycondensation | new poly(ester-amide)s

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