



PLA scaffolds production from Thermally Induced Phase Separation: effect of process parameters and development of an environmentally improved route assisted by supercritical carbon dioxide

Submitted by Brice Calvignac on Fri, 02/23/2018 - 12:03

Titre	PLA scaffolds production from Thermally Induced Phase Separation: effect of process parameters and development of an environmentally improved route assisted by supercritical carbon dioxide
Type de publication	Article de revue
Auteur	Gay, Swann [1], Lefebvre, Gaëtan [2], Bonnin, Marie [3], Nottelet, Benjamin [4], Boury, Frank [5], Gibaud, Alain [6], Calvignac, Brice [7]
Editeur	Elsevier
Type	Article scientifique dans une revue à comité de lecture
Année	2018
Langue	Anglais
Date	Juin 2018
Pagination	123-135
Volume	136
Titre de la revue	The Journal of Supercritical Fluids
Mots-clés	Life cycle assessment (LCA) [8], Polylactic acid (PLA) [9], Scaffold [10], Supercritical CO ₂ [11], TIPS [12]
Résumé en anglais	<p>In this work, a relatively large scale of PLA scaffolds was produced using thermally induced phase separation (TIPS) combined with a supercritical carbon dioxide (SC-CO₂) drying step as a green alternative. For the TIPS step, the phase separation of PLA and 1,4-dioxane solvent was controlled by adjusting the process conditions such as the polymer concentration and molecular weight, the 1,4-dioxane solvent power and the cooling conditions. The scaffolds morphology was analyzed by scanning electron microscopy. Their structural and mechanical properties were correlated together with the possibility to tune them by controlling the process conditions. An environmental analysis using the Life Cycle Assessment (LCA) methodology confirmed a reduction of at least 50% of the environmental impact of the whole process using the SC-CO₂ drying compared to the traditional freeze-drying technology. This work is the first known attempt to conduct the LCA methodology on TIPS process for the PLA scaffolds production.</p>
URL de la notice	http://okina.univ-angers.fr/publications/ua16828 [13]
DOI	10.1016/j.supflu.2018.02.015 [14]
Lien vers le document	https://www.sciencedirect.com/science/article/pii/S089684461730863X [15]
Titre abrégé	The Journal of Supercritical Fluids

Liens

- [1] <http://okina.univ-angers.fr/swgay/publications>
- [2] <http://okina.univ-angers.fr/publications?f%5Bauthor%5D=17047>
- [3] <http://okina.univ-angers.fr/m.bonnin/publications>
- [4] <http://okina.univ-angers.fr/publications?f%5Bauthor%5D=7009>
- [5] <http://okina.univ-angers.fr/f.boury/publications>
- [6] <http://okina.univ-angers.fr/publications?f%5Bauthor%5D=10418>
- [7] <http://okina.univ-angers.fr/b.calvi/publications>
- [8] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=24337>
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- [11] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=10748>
- [12] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=24336>
- [13] <http://okina.univ-angers.fr/publications/ua16828>
- [14] <http://dx.doi.org/10.1016/j.supflu.2018.02.015>
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Publié sur *Okina* (<http://okina.univ-angers.fr>)