ISGC 2017
May 16rd - 19th

N°332 / OC
TOPIC(s) : Alternative solvents

Ionic liquids solutions as remarkable extraction solvents of value-added compounds from biomass

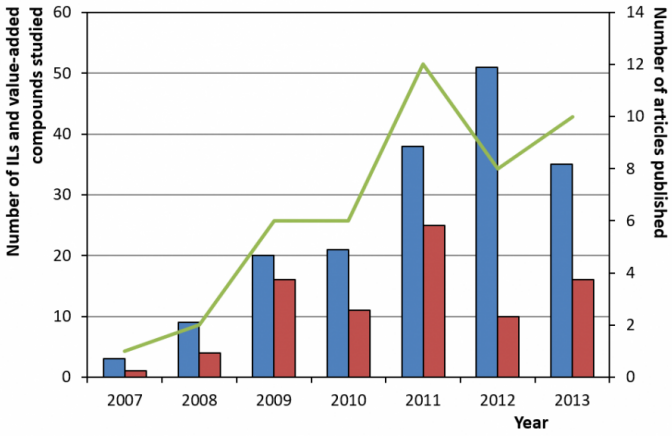
AUTHORS

Helena PASSOS / CICECO, UNIVERSITY OF AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO
Mara G. FREIRE / CICECO, UNIVERSITY OF AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO
João A. P. COUTINHO / CICECO, UNIVERSITY OF AVEIRO, CAMPUS UNIVERSITÁRIO DE SANTIAGO, AVEIRO
Corresponding author : Mara G. FREIRE / maragfreire@ua.pt

PURPOSE OF THE ABSTRACT

In the past few years, the investigation on the application of ionic liquids (ILs) as alternative solvents for the extraction of value-added compounds from biomass has been a hot topic of research. Based on an extended compilation and analysis of the data hitherto reported, as well as on our previous works, a critical review was written [1] with the main objective of providing an overview on the use of ILs (and their mixtures with molecular solvents) for the extraction of value-added compounds present in natural sources (Figure 1). The ILs (or IL solutions) investigated as solvents for the extraction of natural compounds, such as alkaloids, flavonoids, terpenoids, lipids, among others, were outlined. The extraction techniques employed, namely solid-liquid extraction, and microwave- and ultrasound-assisted extractions, were emphasized and discussed in terms of extraction yields and purification factors. Furthermore, the evaluation of the IL chemical structure and the optimization of the process conditions (IL concentration, temperature, biomass-solvent ratio, etc.) were critically addressed. Major conclusions on the role of the ILs towards the extraction mechanisms (Figure 2) and improved extraction yields were additionally provided. The isolation and recovery procedures of the value-added compounds were ascertained as well as some scattered strategies already reported for the IL solvent recovery and reusability. Finally, a critical analysis on the economic impact versus the extraction performance of IL-based methodologies was also carried out and was presented and discussed. Based on this critical review,[1] we will show the major research trends and findings published up to date regarding the improvements achieved with such thrilling IL solutions.

FIGURES



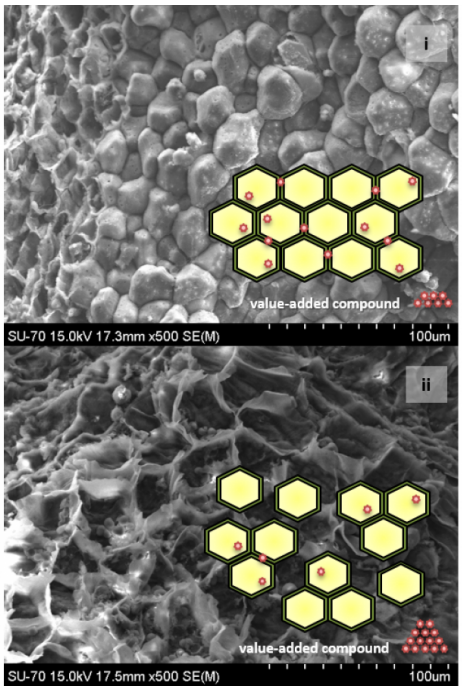


FIGURE 1

ILs as solvents for the extraction of value-added compounds.

Data from 2007 to 2013: number of articles per year (green line), number of ILs studied (blue bars), and number of extracted value-dded compounds (red bars). Reproduced from [1] with permission from The Royal Society of Chemistry.

FIGURE 2

The extraction mechanism of value-added compounds from biomass with ILs solutions.

SEM pictures and schematic representation of the extraction mechanism of caffeine from guaraná seeds with (i) water and (ii) IL aqueous solution. Reproduced from [1] with permission from The Royal Society of Chemistry.

KEYWORDS

Ionic liquids | Solvents | Solid-liquid extraction | Value-added compounds

BIBLIOGRAPHY

[1] H. Passos, M.G. Freire, J.A.P. Coutinho, Green Chem. 2014, 16, 4786-4815.

Acknowledgments:

This work was developed within the scope of the project CICECO-Aveiro Institute of Materials, POCI-01-0145-FEDER-007679 (FCT Ref. UID /CTM /50011/2013), financed by national funds through the FCT/MEC and when appropriate co-financed by FEDER under the PT2020 Partnership Agreement. H. Passos also acknowledges FCT for the doctoral grant SFRH/BD/85248/2012. M.G. Freire acknowledges the European Research Council (ERC) for the Starting Grant ERC-2013-StG-337753.