Author's Accepted Manuscript

www.elsevier.com/locate/memsci

Novel Inorganic Membrane for the Percrystallization of Mineral, Food and Pharmaceutical Compounds

Julius Motuzas, Christelle Yacou, Rasmus S.K. Madsen, Weng Fu, David K. Wang, Anne Julbe, James Vaughan, João C. Diniz da Costa

PII: S0376-7388(17)33205-2
DOI: https://doi.org/10.1016/j.memsci.2017.12.077
Reference: MEMSCI15848

To appear in: *Journal of Membrane Science*

Received date: 8 November 2017
Revised date: 13 December 2017
Accepted date: 28 December 2017

Cite this article as: Julius Motuzas, Christelle Yacou, Rasmus S.K. Madsen, Weng Fu, David K. Wang, Anne Julbe, James Vaughan and João C. Diniz da Costa, Novel Inorganic Membrane for the Percrystallization of Mineral, Food and Pharmaceutical Compounds, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2017.12.077

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Novel Inorganic Membrane for the Percrystallization of Mineral, Food and Pharmaceutical Compounds

Julius Motuzas,[a] Christelle Yacou,[a,b] Rasmus S. K. Madsen,[a] Weng Fu,[a] David K. Wang,[a,c] Anne Julbe,[d] James Vaughan,[a] João C. Diniz da Costa[a*]

[a]The University of Queensland, FIM^{2}Lab – Functional Interfacial Materials and Membrane Laboratory, School of Chemical Engineering, Brisbane Qld 4067, Australia.

[b]Université des Antilles, Department of Engineering, BP 250, 97157 Pointe-à-Pitre Cedex, Guadeloupe, France.

[c]The University of Sydney, School of Chemical and Biomolecular Engineering, Sydney, NSW 2006, Australia.

[d]Institut Européen des Membranes (UMR 5635 CNRS, ENCM, UM), Université de Montpellier, CC47, Place Eugène Bataillon, 34095 Montpellier Cedex 5, France.

Accepted manuscript

Abstract

This work demonstrates for the first time the phenomenon of continuous percrystallization using a carbon membrane derived from the pyrolysis of food grade sugar. In addition, it is also the first demonstration of membranes separating solute from solvent and delivering dry crystals in a single step. This is contrary to membrane crystallization, which requires two further processing steps to filter crystals from a solution followed by drying the wet crystal particles. The results indicate that carbonised sugar membranes can confer ideal conditions of super-saturation, leading to instantaneous and continuous percrystallization of compounds at the permeate side of the membrane. As a result, very high percrystallization production rates of up to 55,000 kg m^{-2} per year are achieved. It is proposed that the percrystallization occurs in a wet thin-film modulated by solution permeation via the mesopores of the membrane, where vapour and crystals are separated at the membrane's solid-liquid-vapour interface. The potential deployment of this novel

Download English Version:

https://daneshyari.com/en/article/7020162

Download Persian Version:

https://daneshyari.com/article/7020162

Daneshyari.com