

Membrane Percrystallisation of Mineral Brines, Food and Pharmaceutical Compounds

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Abstract

This work demonstrates for the first time the concept of membrane percrystallisation. In the case of hydrophobic membranes, a solution diffuses through the mesopores of a bio-inspired carbonised sugar membrane, and under vacuum pressure, a wet thin-film is formed on the permeate side of the membrane. At the wet thin film interface, the permeated solvent evaporates leading to ideal conditions of continuous nucleation and crystallization of solutes. As a result, both solvent and dry solute are separated in a single-step process. The percrystallisation process delivers small NaCl crystals varying between 10-30 μm as displayed in Fig. 1. This concept is demonstrated for the percrystallisation of mineral salts, food and pharmaceutical compounds. In the case of hydrophilic membranes, percrystallisation of salts occurs via a pore storage mechanism described by a single salt production coefficient, and a global salt production coefficient for metal chloride salts. This presentation addresses these novel concepts in inorganic membrane science and technology.

