

Keynote Paper

Influence of membrane-structural properties on membrane assisted-crystallization process

Enrico Drioli^a, Zhaoliang Cui^{b,c,d}, Francesca Macedonio^a

^a *Research Institute on Membrane Technology, ITM-CNR, Via Pietro Bucci 17/C, Rende 87036, Italy*

^b *State Key Laboratory of Materials-Oriented Chemical Engineering, College of Chemical Engineering, Nanjing Tech University, Nanjing 210009, China*

^c *National Engineering Research Center for Special Separation Membrane, Nanjing Tech University, Nanjing 210009, China*

^d *Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM)*

Abstract

Membrane assisted crystallization (MCr) is an innovative process which combines crystallization process with membrane technology. This operation uses hydrophobic microporous membranes for promoting solvent evaporation from a feed solution thus concentrating it above its saturation limit and attaining a supersaturated environment where crystals may nucleate and grow. In a membrane crystallizer the membrane matrix acts as a selective gate for solvent evaporation, modulating the final degree and the rate for the generation of the supersaturation. Hence, acting on the transmembrane flux, either by changing the driving force of the process or by choosing membrane with proper characteristics, allows controlling the crystallization process very precisely. In this work, different composite membranes were tested in MCr operations. The coating of PVDF membranes with Hyflon has been also studied for increasing membrane surface hydrophobicity. The latter is the membrane essential characteristic when MCr is implemented according direct contact membrane distillation configuration like in the present work. The aim was to analyze the MCr performance in terms of membrane chemical–physical properties and process operating conditions.

Keywords: Membrane crystallization; PVDF membrane; membrane structural characteristics.