IDENTIFICATION OF FOULING MECHANISM IN ULTRAFILTRATION USING A 3D PRINTED TURBULENCE PROMOTER

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Abstract

Membrane filtration processes (such as ultrafiltration, UF or nanofiltration, NF) seem to be promising methods for the treatment of dairy industrial wastewater, which has several advantages compared with other conventional methods. Unavoidably, membrane fouling always hinders the membrane performance. Fouling decreases permeate flux severely and thus increases filtration processing time, which is not economically effective. The characterization of membrane fouling mechanism is highly important especially during the ultrafiltration process. In order to produce higher permeate flux and greater solute rejections, a clear understanding on membrane fouling mechanism is essential.

In this study, we compared the ultrafiltration of model dairy wastewater without and with turbulence promoter. We used a 3D printed turbulence promoter, which was designed based on our previous work. The comparison included the examination of the reduction of fluxes at different pressure values (0.1, 0.2 and 0.3 MPa), different mixing speeds (100, 200, 300 and 400 rpm) and the different fouling models. With the resistance-in series model, the Hermia model and the Makardij model, we investigated how the membrane fouling changes with the use of the promoter.

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