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(54) **MEMBRANE DEVICE AND PROCESS FOR MASS EXCHANGE, SEPARATION, AND FILTRATION**

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See application file for complete search history.

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(51) **Int. Cl.**
B01D 53/22 (2006.01)
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(57) **ABSTRACT**

A membrane device and processes for fabrication and for using are disclosed. The membrane device may include a number of porous metal membranes that provide a high membrane surface area per unit volume. The membrane device provides various operation modes that enhance throughput and selectivity for mass exchange, mass transfer, separation, and/or filtration applications between feed flow streams and permeate flow streams.

(52) **U.S. Cl.**
CPC **B01D 71/022** (2013.01); **B01D 53/02** (2013.01); **B01D 53/228** (2013.01);
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