



Editorial Note

Membrane Engineering for Today and for Tomorrow

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When in the early 80's the European Membrane Society was created, the term Membrane Engineering was not existing. A membrane industry was just appearing. The overall membrane market was less than US\$1 billion per year. However, very interesting the fact that all around the world and particularly in Japan, China, USA and Europe, membrane science and research started to attract a very significant attention. The journal Membrane Science was founded in 1976 and it started a very successful story; MAKU (membrane in Japanese) was the scientific journal of Japan Membrane Society created at the end of 70's. The European Membrane Society was created in 1981 and, few years later, also the North America Membrane Society started its activities following the first very successful conference on membranes in Stresa (ITALY) organized

by the European Membrane Society and the Membrane Society of Japan. Also, in China the attention to membrane science and research was already evident as well testified by the creation in November 1981 of the Membrane Science and Technology Journal and by the editorial of Prof. Zheng Zaixing: "Membrane systems are present everywhere in Nature, especially in living organs but the progress of human knowledge in these fields is rather slow... Our magazine appears at a historical and critical moment..."

Today, Membrane Engineering and Membrane Operations, in general, impact on the most strategic processes (Figure 1). The most successful case is in desalination (Figure 2).

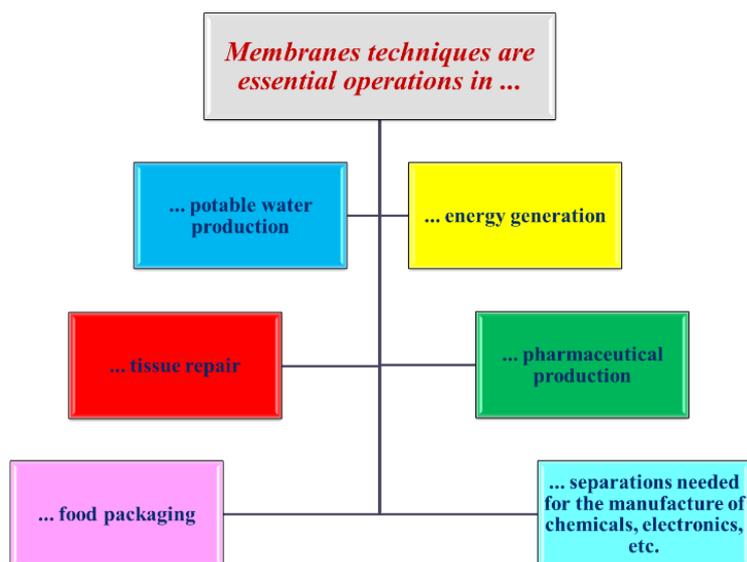
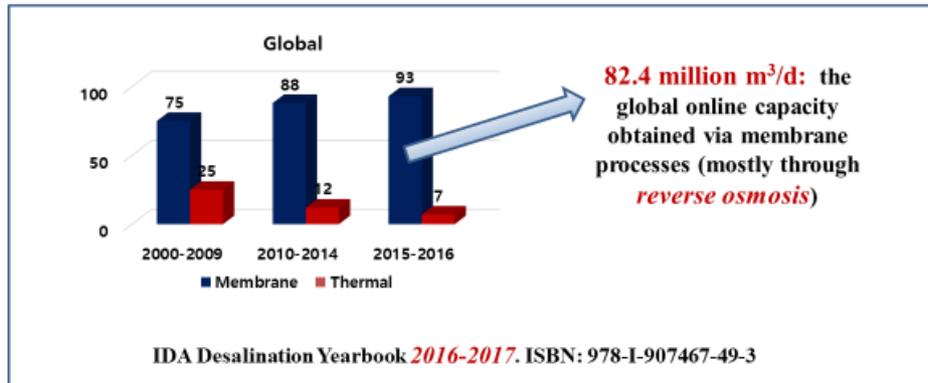


Fig. 1. Sectors where membranes are fundamental processes.

TIME EVOLUTION OF MEMBRANE VS THERMAL TECHNOLOGIES



Membrane technologies continue to dominate the desalination market. 90% of desalination capacity contracted since 2010 employs membrane technologies, with the use of thermal technologies for large scale projects remaining concentrated in the Middle East

IDA Water Security Handbook 2018-2019.

Fig. 2. Evolution of desalination market.

The success of Membrane Engineering in desalination, however, is not yet at the end. Very important improvements are already in progress and will impact on the future quality of strategic sectors, such as the possibility to combine desalination with energy production and metals recovery (Figure 3). China is an interesting case for analysing the progresses of membrane science and research worldwide. Today, in fact, the situation of Membrane Engineering, the term very well accepted and quite visible, is related to the progresses of this country in chemical processes. In fact, you can read in the report of J.F. Tremblay published by C&EN in 2017 (“Made in China” now

extends to chemical process technology. 2017. C&EN, Volume 95, issue 42, pp.16-17), that China, traditionally an importer of chemical processes, is now an exporter of various chemical systems in which membrane operations have been introduced and are contributing to make this Chinese technology competitive worldwide. It is the case of organic solvent nanofiltration (OSN) technology, zeolite membranes, catalysis (and in particular industrial catalysis), conversion of carbon dioxide and methane into synthesis gas, etc., citing just a few examples.

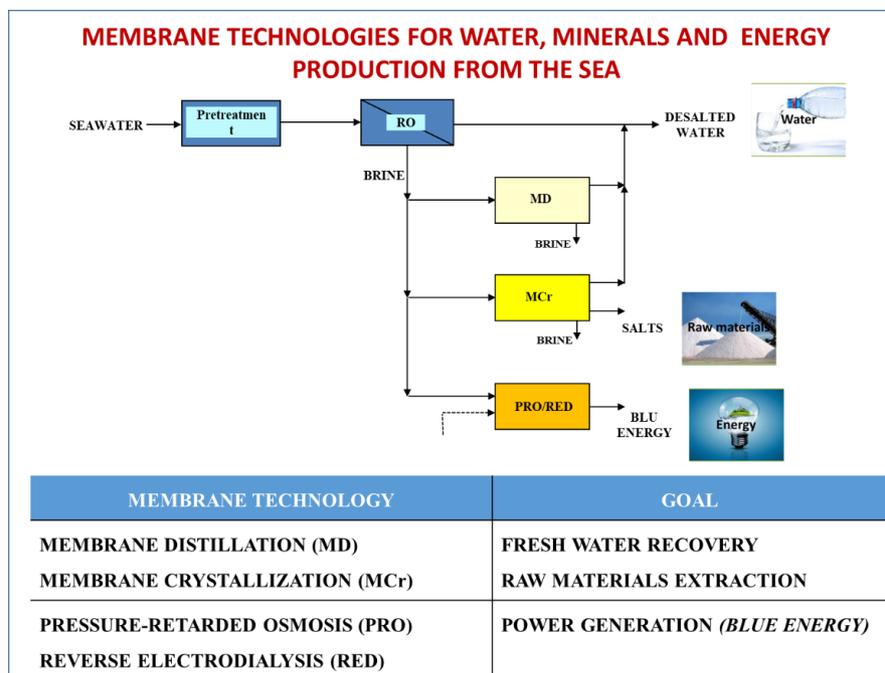


Fig. 3. Improvement of desalination.

In this special issue of the *Journal of Membrane Science and Research*, we are trying to discuss some interesting progresses in the Membrane Engineering field such as water treatment, gas separation, dairy industry, etc., and some progresses in membrane fabrication (such as mixed matrix membranes, electrospun nanofibers, etc.).