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Editorial Note

Membrane Engineering: Future Perspectives

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It is interesting to realize the important growing role that today *Membrane Engineering* is having in *Process Engineering*, in *Medicine*, in *Biotechnology*. Membrane operations are already a dominant technology in seawater and brackish water desalination all around the world, including also areas, as Middle East where thermal systems have been and still are normally used.

Further progresses in energy consumption, cost reduction, and environmental problems might be reached by the introduction of integrated membrane operations using also Membrane-distillation (MD) and Membrane-crystallization units as predicted in the program in progress in Korea (Global MVP, Director Prof. Seung-Hyun Kim). Desalination in the future years might have as final goal minerals production from the sea, energy production from the salinity gradients created with high concentrated brines, and fresh water production. The traditional mining industry might be significantly redesigned.

Similar success have been obtained in water reuse with Membrane-bioreactors (MBR) considered as BAT in Europe. *Medicine - Regenerative Medicine* and *Tissue Engineering* are today largely related to *Membrane* systems. Hybrid artificial organs (from artificial liver to artificial brain) have been realized or are under investigations. Their utilization as extracorporeal device or for studies of pharma-kinetic are quite promising. Studies on new materials for innovative membranes well designed and appropriate for the new utilization are necessary for further developments.

Most of the new membrane operations such as Membrane-distillation, Membrane-emulsifiers, Membrane-crystallizers and Membrane-condenser, are based on hydrophobic microporous membranes and not on hydrophilic materials. New polymers with stable hydrophobic properties have to be developed. Per-fluoroamorphous polymers are becoming of particular interest for these new operations. Thermal phase inversion and new green solvents are also the objectives of research projects for further development of these new operations.

Membrane Engineering can be recognized as the most appropriate approach for solving the problems of a modern developing industrial Society. We will need new generations of engineers and scientists to satisfy the huge potentialities of membrane science and membrane engineers.