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## Integrated membrane processes for sustainable industrial production and water treatment

The increase of world population and the intensive demand for food, goods, water and energy is driving a depletion of resources as well as a dramatic impact on environment. It is clear that advanced technologies play a key role in providing strategies to face challenges of modern globalized society. Membrane technology is recognized among the most efficient, precise, flexible, clean, low energy input technology. Various nanostructured membrane-based processes are nowadays state-of-the-art in implementing separation at molecular level, recognition, concentration, conversion, formulation. Integrating different membrane operations as well as combining them with other type of technologies permits to efficiently tune output products and obtain co-products instead of byproducts or waste. For example, liquid beverage processing, active ingredients production, chemical manufacturing, biorefinery, safety, water treatment and water desalination well confirm these possibilities. Case studies will be illustrated concerning the development of integrated processes for the purification of vegetative water coming from olive oil industry with simultaneous recovery, transformation and formulation of biophenols based ingredients. The non-edible organic fraction could also be used to produce biogas and its suitable purification for energy use was achieved by using polymeric membranes. The achievements of membrane-based sea water desalination for both potable water production and minerals extraction will be highlighted. Membrane-based operations play a role also in monitoring and decontaminating air and water. An integrated system using biosensors are able to detect harmful gaseous substances and promote the activation of decontamination process based on enzyme-loaded membrane will be illustrated.

### Biography

Lidietta Giorno has her expertise in membrane science and technology. Her research activity include membrane bioengineering, biocatalytic membrane reactors, enzyme immobilization, nanostructured and multifunctional membranes, integrated membrane systems for bioseparations and bioconversions, downstream processing based on molecular separation, membrane chirotechnology, membrane emulsifier, integrated membrane operations for water treatment.

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