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## Preface

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**Biographical notes:** Sirshendu De did his BTech, MTech and PhD from IIT Kanpur. He joined IIT Kharagpur in 1997. His main research area is membrane separation, transport phenomena. He has more than 100 publications in international journals. He is guest Editor of *International Journal of Environment and Waste Management* (IJEWM). He has written three books. He has three patents in his credit. He is life member of Indian Institute of Chemical Engineers (IChE).

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Yung-Tse Hung did his PhD in Environmental Engineering from the University of Texas at Austin in 1970. He has about 473 publications and presentations (about 170 refereed publications, about 244 other scholarly publications and presentations, 12 books, 47 book chapters). He is Editor-in-Chief, *OCEESA Journal* (Overseas Chinese Environmental Engineers and Scientists Association), co-editor of several environmental engineering books (Humana Press), guest editor, special issue, entitled 'Industrial Waste

Treatment', *International Journal of Environmental Pollution*, <http://www.inderscience.com/browse/callpaper.php?callID=314> and Editor, *International Journal of Environment and Waste Management (IJEWM)*, <http://www.inderscience.com/ijewm>.

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Environmental pollution is nowadays a burning social issue. Sources of groundwater pollution are agricultural land, untreated domestic sewer, effluent from both large and small scale industries. With rapid global industrial development, industrial waste becomes a major source of groundwater pollution. Hence, developments of civilisation, technological advance, etc., are irreversibly associated with large scale environmental pollution. Some of the major pollution creating industries are textile, dye manufacturing, tanneries, pulp and paper, pharmaceuticals and various other manufacturing units. Therefore, pollution control and management of industrial waste is a primary technology concern and is an area of active research. Unfortunately, most of the conventional pollution treatment processes are not green enough. In other words, these processes generate secondary pollution to abate the primary one. Thus, the focus and centre of pollution shifts from one point to another. For example, adsorption is the oldest and quite popular pollution controlling technology. This has been widely used for removal of textile dyes and organic chemicals from aqueous streams. Activated carbon is a common adsorbent. Being expensive, research is aimed to develop adsorbent from cheaper sources. But during adsorption process, disposal of adsorbent with pollutant becomes another problem. Same observation is valid for other conventional techniques, like, coagulation, flocculation, chemical treatment, etc. Therefore, continuous research effort is directed to develop so-called greener treatment processes which are eco-friendly and do not lead to secondary pollution. Membrane based processes offer an attractive alternative in this regard. These processes have several advantages, e.g.,

- they are physical separation processes
- no extra chemicals are required
- no phase change occurs
- easy to operate, etc.

Appropriate selection of the process results into two streams, one is permeate which is either a clean water (if reverse osmosis is used as the last step) or a salt rich stream (if reverse osmosis is used as the last step). In the former, the produced stream can be reused as process water, even drinking water. In the later case, salt rich stream can be recycled back to the upstream units. Retentate stream, either rich in chemicals or usable solids can be recycled. Therefore, judicious implementation of membrane processes can lead to an ideal *zero discharge plant*. Similar greener process is bioremediation. Abatement of polluting stream through action of bio-organism is also an equivalent process which does not always lead to another source of pollution.

In this special issue, we have a series of recent papers pertinent to management of environmental and industrial waste management, starting from textile, tannery to distillery and natural rubber wastewater. Although the theme of this special issue is membrane based processes and bioremediation, some papers in the relevant fields, like, adsorption, electro-coagulation, etc., are also included. These articles present a glimpse of front line research in the field of aqueous pollution control. It is envisaged that these assorted articles will lead to new ideas in the research scale as well as practical industrial level. We hope that some of the ideas from this collection will have a positive impact on abatement of pollution and sustainability of environment in near future.