

## Anaerobic digestion: closing cycles for sustainability

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Anaerobic digestion (AD) has been traditionally applied as a way to process efficiently wastes, in order to reduce or mitigate their direct environmental impact. However, research and development conducted during the last decades have transformed AD into a resource-recovery oriented technology. Indeed, methane, nutrients, water and organic molecules are some of the valuable products that can be recovered from a wide variety of feedstocks. Anaerobic biotechnology has then a great potential to become a relevant technology helping modern societies to advance towards a more sustainable development.

The World Congress of Anaerobic Digestion represents the most important international forum dedicated to the discussion and analysis of the state of the art of anaerobic bioprocesses. Its 14th version was held on Viña del Mar, Chile, organized by a group of 6 Chilean Universities, with the support of the Specialist Group of Anaerobic Digestion of the International Water Association (IWA). This special issue of “Reviews in Environmental Science and Bio/technology” is presented as the result of the collaborative work of the Journal and the Conference organization. It presents a series of reviews of selected invited

authors, dealing with relevant aspects of Anaerobic Biotechnology. Most of the reviews forming this issue have been also presented as key-note or plenary presentations during the Conference.

This special issue has been conceived to offer an up to date revision of the knowledge related with a variety of aspects involved in the application of anaerobic bioprocesses. This compilation is then intended to become a valuable tool for students and researchers looking for information about anaerobic digestion, its development, and challenges.

Readers will find reviews dealing with the microbiology of anaerobic digestion. Anaerobic digestion is a biological process, then information about the microorganisms involved, its interactions, and the tools to study them are of great relevance. Modelling and control of anaerobic processes are also covered in two separated reviews. These tools can provide great assistance to further understand the complex dynamics involved in AD, and can provide useful tools to assist the operation of the installations based on this technology. During the last 40 years, anaerobic digestion has been increasingly applied to the treatment of industrial and domestic wastewaters. Two reviews are dedicated to cover such applications. Biogas has been conceived as one of the main products of anaerobic digestion, considering its potential use as source of renewable energy. Microaeration can be used as a way to improve biogas quality, by removing hydrogen sulphide. On the other hand, biogas upgrading offers the possibility to add economical value

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to the methane contained in the biogas, by producing a renewable substitute for natural gas. Each one of these two technologies originates a review on their own. However, anaerobic digestion offers much more than just methane based biogas, and other products have the

potential to become relevant drivers for this technology in the future. The possibility to have “anaerobic digestion without biogas” and the potential to use AD as a way to produce biohydrogen are the reviews that close this special issue.