

Model Development for AD-MEC Systems

Anaerobic digestion (AD) is a well-known and established technology used for biogas generation via oxidation of organic matter by microorganisms and production of biomethane. Microbial electrolysis cells (MEC) are new technology that can also be used for methane production over cathode electrodes while treating organic wastes over anode electrode. To increase the rate of organic oxidation and methane production, a new integrated configuration, AD-MEC, has been proposed. In this system electrodes are inserted in AD reactors, so that it functions as bioelectrochemical reactor and methane production occurs at cathode surface as well as the bulk of the reactor. Though promising outcomes were obtained in laboratory studies, scaling-up of AD-MEC systems remains to be the most significant challenge. There are many parameters in AD-MEC systems, hence optimizing system performance becomes a challenging process. Also, the commercialization of AD-MEC also requires the development of model-based optimization and process control approaches. Mathematical models are powerful tools for comprehending the interactions of the parameters in AD-MEC. In this seminar, modelling strategies for AD and MEC systems will be introduced and possible modelling approaches for AD-MEC integrated systems will be explained. The approaches will be based on important considerations in bioelectrochemical model development for optimization of the process conditions of large-scale AD-MEC.

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