

Membrane photobioreactor as a device to increase CO₂ mitigation by microalgae

Abstract

The integration of a membrane contactor with a photobioreactor serves two major purposes for the mitigation of CO₂ by microalgae, i.e., to enhance the mass transfer and interfacial contact between two different phases and to increase the exchange process of CO₂-O₂ by microalgae in the photobioreactor. The membrane integrated with a photobioreactor for CO₂ mitigation by microalgae can be considered as a relatively new field, and only four or five related research efforts have been published in the literature, suggesting that a significant amount of work remains to be done in this field. In addition, all of the authors agreed that a membrane contactor is capable of achieving better mass transfer than the conventional approach of using a separation column in the gas-liquid separation process. One significant problem associated with using a membrane as a CO₂-O₂ gas exchanger is its susceptibility to pore fouling due to the micron-size cells of the microalgae. However, pore fouling can be prevented by using a hydrophobic membrane contactor and appropriate operating conditions, both of which are discussed in detail in this work.