INTERNATIONAL EURASIAN CONFERENCE ON BIOTECHNOLOGY AND BIOCHEMISTRY

BioTechBioChem 2020

PROCEEDING BOOK

(Abstracts and Full-Text Papers)

16-18 December 2020

Ankara, Turkey

www.biotechbiochem.org

ISBN: 978-625-409-179-7

International Eurasian Conference on

Biotechnology and Biochemistry (BioTechBioChem 2020)

December 16-18, 2020

Ankara, Turkey

www.BioTechBioChem.org

PROCEEDING BOOK

(Abstracts and Full-Text Papers)

Editor

Prof. Dr. Zeliha Selamoğlu

Associate Editor

Assoc. Prof. Dr. Mustafa Sevindik

ISBN: 978-625-409-179-7

Publication Date: December 2020

Congress Web Page

www.biotechbiochem.org

E-mail

info@biotechbiochem.org

➢ *ORAL PRESENTATION*

Comparison of Bioelectrochemical Systems and Conventional Aeration Systems for Wastewater Treatment

Secil Tutar Oksuz (https://orcid.org/0000-0002-2713-7379)

Konya Technical University, The *Engineering and Natural* Sciences *Faculty, Environmental Engineering, Konya, Turkey.*

Corresponding author e-mail: stutar@ktun.edu.tr

Abstract

Conventional activated sludge systems can efficiently degrade organic pollutants, but generally energy-intensive and require high investment, maintenance, and operating costs due to the aeration and sludge treatment associated processes, so aeration can amount to 45-75% of wastewater treatment plant energy costs, while the treatment and disposal of sludge may count up to 60% of the total operation cost. To reduce the cost, other options could be used to make an energetically sustainable process. Bioelectrochemical systems (BESs) is one of the promising technologies in which organic matter is oxidized using electrochemically active bacteria under anaerobic conditions to convert chemical energy to electrical energy, and have potential applications in wastewater treatment. In this study, we compared BESs and conventional wastewater treatment systems in terms of COD removal and energy performances. We used lab-scale reactors to quantitatively audit the power generated or consumed during the operation of a 3-electrode electrochemical cell with flow-through electrodes, a 3-electrode electrochemical cell using a planar electrode of the same size, and an aeration tank with a pump air diffuser during treatment of raw domestic wastewater. The bioelectrochemical experiments were carried out under potentiostatic control using a three-electrode electrochemical arrangement similar to the microbial fuel cell. The results showed that the current generation using flow-through electrodes is faster than using flat electrodes. We also found that both systems can achieve almost the same COD removal rate, but the conventional system can treat it faster than BESs. Our results demonstrated that BESs can be a viable wastewater treatment technology.

Keywords: bioelectrochemical systems, wastewater treatment, COD