Electrochemical ozone production in inert supporting electrolytes on a boron-doped diamond electrode with a solid polymer electrolyte electrolyzer

Jusol Choia, Choonsoo Kom, Jiye Kimx, Seonghwan Kimx, Yongsug Takb, Changha Leec,*, Jeyong Yoonx,*

aSchool of Chemical and Biological Engineering, College of Engineering, Institute of Chemical Process, Asian Institute for Energy, Environment & Sustainability (AIEES), Seoul National University (SNU), Gwanak-gu, Daehak-dong, Seoul 151-742, Korea, Tel. +82 2 880 8927; Fax: +82 2 876 8911; email: jeyong@snu.ac.kr (J. Yoon)
bDepartment of Chemical Engineering, Inha University, Inchon 402-751, Korea

cSchool of Urban and Environmental Engineering, Ulsan National Institute of Science and Technology (UNIST), 100 Banyeon-ri, Eonyang-eup, Ulju-gun, Ulsan 689-798, Korea, Tel. +82 52 217 2812; Fax: +82 52 217 2809; email: clee@unist.ac.kr (C. Lee)

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ABSTRACT

This study investigated how inert supporting electrolytes (SEs), which increase the electrical conductivity, affect electrochemical ozone production (EOP) on a boron-doped diamond (BDD) electrode. Regardless of the SE species, the EOP was suppressed about 60% in a SE concentration of 1 mM for which the conductivity is similar to that of tap water compared to deionized water. The production of H2O2, which is known to be generated by the combination of ·OH, was also suppressed. On the other hand, the formation of ·OH was not significantly affected by the presence of SEs, an intermediate for ozone production. Consequently, suppression of EOP by SE can be explained by physical interference from the diffusion or combination of ·OH by the SE anions concentrated near the electrode surface. This study contributes by providing a better mechanistic understanding of the effect of SEs on EOP in a solid polymer electrolyte/BDD system.

Keywords: Electrochemical ozone production (EOP); Boron-doped diamond (BDD); Solid polymer electrolyte (SPE) electrolyzer; Supporting electrolyte

*Corresponding authors.

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