Characterization of the Electrochemical Activity of Butyrate-Producing *Clostridium* sp.

최옥경, 엄영순*
KIST 청정에너지센터
(yum@kist.re.kr*)

A lack of outer membrane proteins in Gram-positive bacteria suggests that electron transfers to electrode are impossible without soluble electron-carrying mediator. Although one of spore-forming *Clostridium butyricum* strain has been reported to be electrically active without the addition of a soluble mediator (Anaerobe, 2001, 7(6), 297-306), the mechanism of electron transfer between electrode and Gram-positive spore formers remains unexplained. Here, we show that the direct electron transfer from one of butyrate-producing *Clostridium* strain to a cathode. Without mediators, the current was consumed by the *Clostridium* strain at a cathode compartment of H-type bioelectrochemical reactor (BER) in which an anode oxidizes ferrous to ferric ion. Other tested strains, *C. acetobutyricum* and *C. tyrobutyricum* did not show current consumption without mediator. Increased reducing powers induced by electron supply to the *Clostridium* strain enhanced butyrate production up to 1.6 times. Also, biofilm formation was electrochemically driven on the surface of cathode, graphite felt. The study of electrochemical activity of *Clostridium* strain can help to understand interaction between Gram-positive spore former and electrode and to apply electricity for an electron donor to microbes.