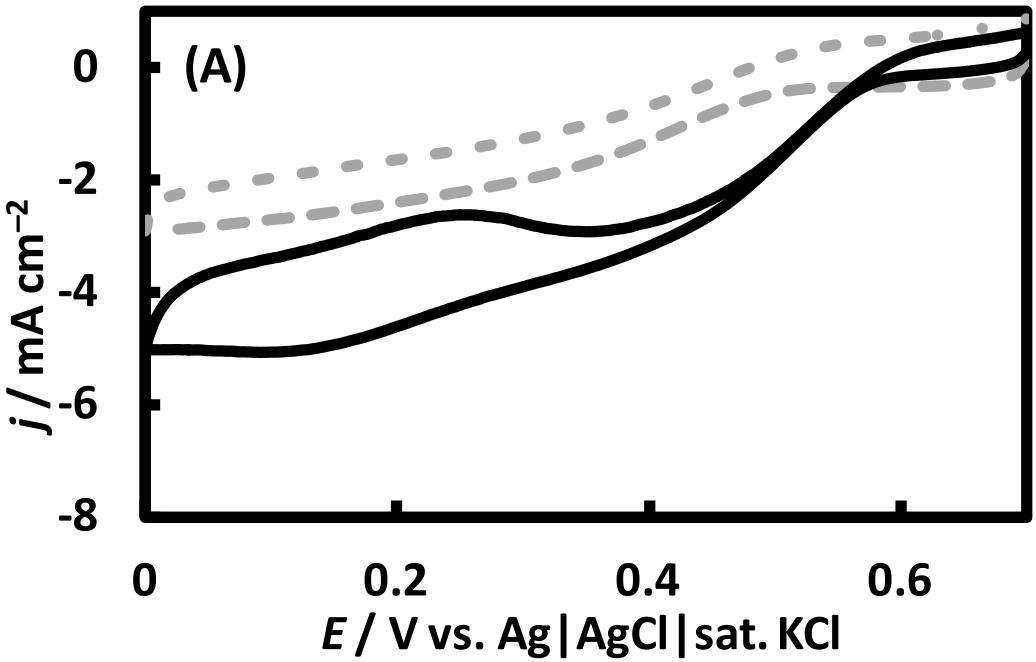
Improvement of a direct electron transfer-type fructose/dioxygen biofuel cell with a substrate-modified biocathode

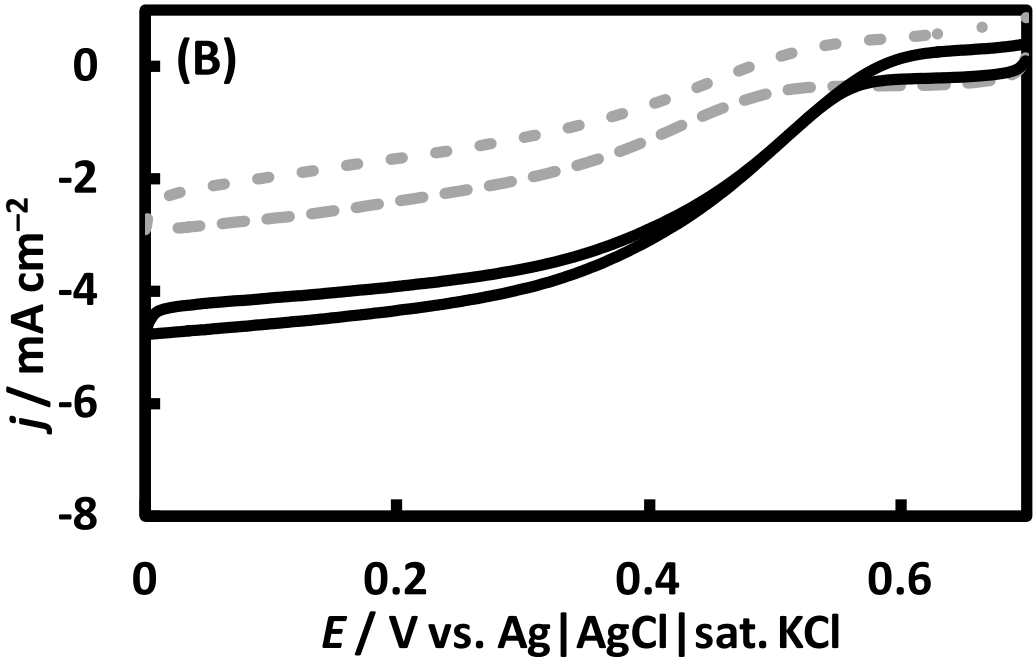
Keisei So,[a] Shota Kawai,[a] Yasuyuki Hamano,[a] Yuki Kitazumi,[a] Osamu Shirai,[a] Makoto Hibi,[b] Jun Ogawa,[a] Kenji Kano*,[a]

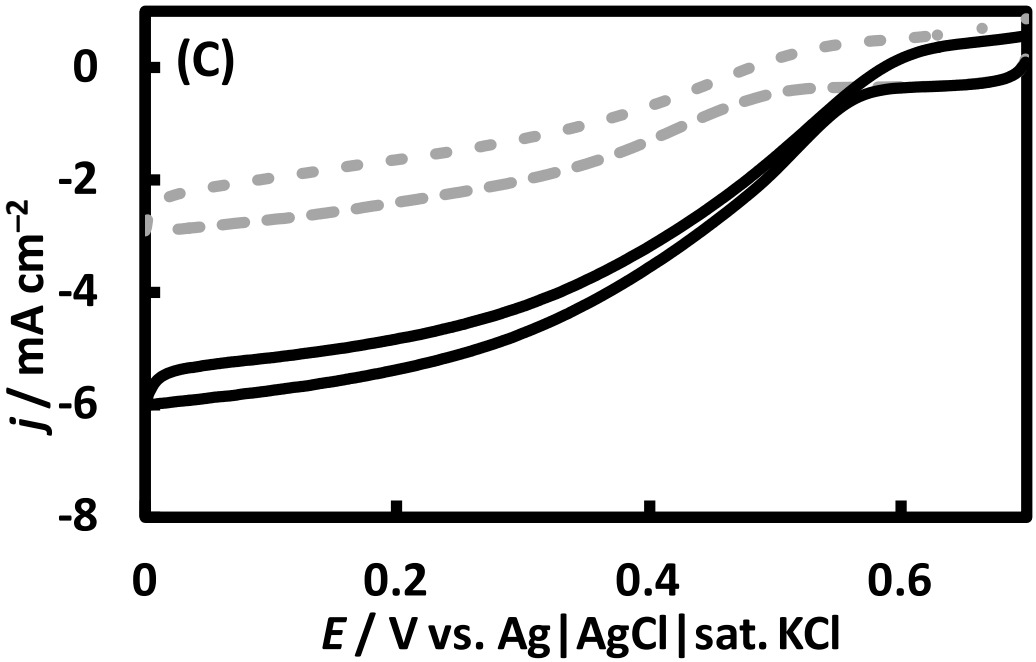
a) *Division of Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Sakyo, Kyoto 606-8502, Japan, E-mail: kano.kenji.5z@kyoto-u.ac.jp (K. Kano).*

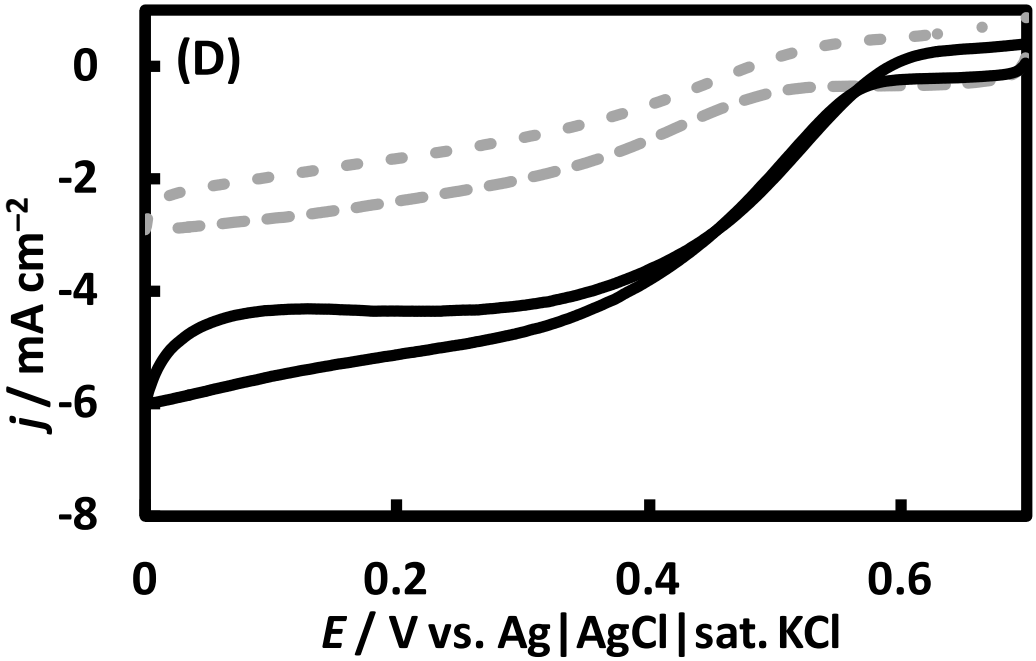
b) *Laboratory of Industrial Microbiology, Graduate School of Agriculture, Kyoto University, Sakyo, Kyoto 606-8502, Japan*

Electronic Supplementary Information









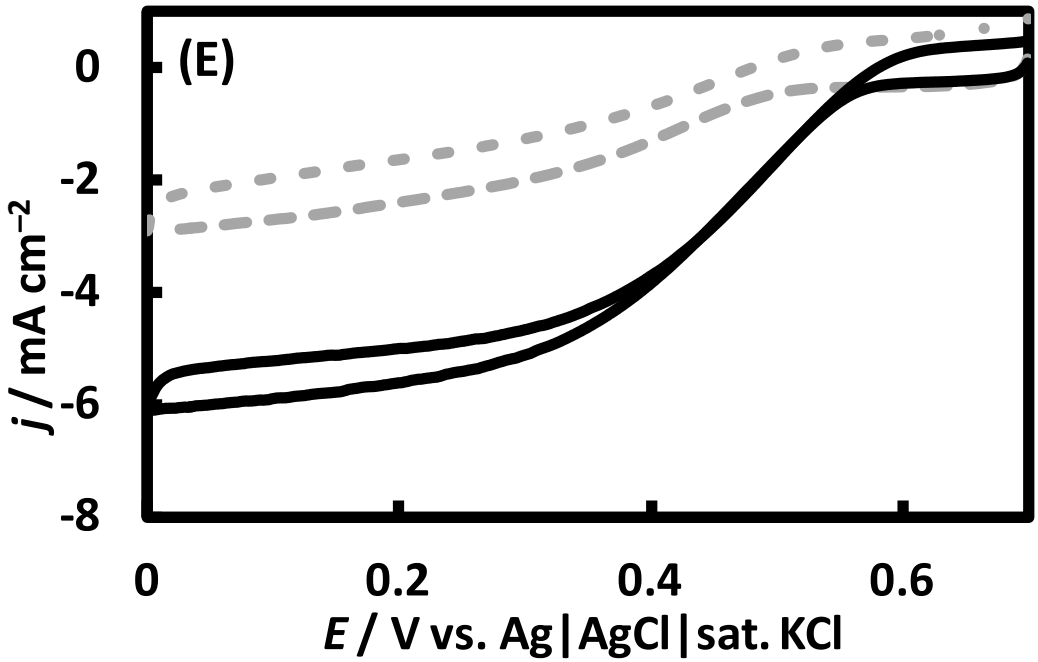


Fig. S1. Rotating disk voltammograms of O_2 reduction catalyzed by BOD adsorbed on KB-GCE pre-modified by (A): catechol, (B): ditaurobilirubin, (C): hemin, (D): hydroquinoine, E: pyrogallol (solid line) and on KB-GCE without modification (dotted line) in an O_2-saturated phosphate buffer (pH 7). The rotating rate was 4000 rpm, and the scan rate was 20 mV s^{-1}.

Table S1. Effects of pretreatments before FDH adsorption and shaking during FDH adsorption on steady-state current density of D-fructose oxidation catalyzed by FDH adsorbed on CPEs. [a)]

Adsorption condition	Pre-treatment		
	control	plasma etching	ethanol
control	5 ± 1	7 ± 1	14 ± 6
with shaking	7 ± 2	6 ± 2	16 ± 6

a) The values indicate the steady-state catalytic current density in mA cm^{-2} on CA at 0.5 V and 100 s after potential step. The measurements were performed by FDH-adsorbed and CCG-mounted CP electrodes in 1 M citrate buffer (pH 5) under quiescent conditions containing 500 mM D-fructose. The errors were evaluated by the Student *t*-distribution at 90% confidence level.