Supporting Information

for

Wrapping Multi-walled Carbon Nanotubes with Anatase Titanium Oxide for the Electrosynthesis of Glycolic Acid

Jun Yang\textsuperscript{a,b,*}, Junfang Cheng\textsuperscript{b}, Jie Tao\textsuperscript{b}, Manabu Higashi\textsuperscript{b}, Miho Yamauchi\textsuperscript{b}, Naotoshi Nakashima\textsuperscript{b,*}

\textsuperscript{a}Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, Ningbo, China
\textsuperscript{b}International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395, Japan

Corresponding authors
*E-mail: nakashima.naotoshi.614@m.kyushu-u.ac.jp (N.N)
*E-mail: yangjun@nimte.ac.cn (J.Y.)
Fig. S1. EDS mapping of Ti-deposited MWNT/PyPBI: (a) STEM image; distribution of (b) C, (c) N, (d) O, and (e) Ti; (f) the profile of the EDX spectrum.
Regarding TiO2 weight in the catalyst:

As seen in Table 1, we found that the conversion of OX increased with the loading amount of TiO2, which suggests that the number of catalytic sites increases with the loading amount. On the other hand, the selectivities for the GC production on MWNT-PyPBI-TiO2-N2 samples with 1 and 2 mg cm$^{-2}$ were almost same, which suggests that the selectivity on the TiO2 over MWNT-PyPBI-TiO2-N2 samples is saturated on high-TiO2-loading samples (i.e., with 1 and 2 mg cm$^{-2}$). Thus, we conclude that the application of MWNT-PyPBI as a support enhances the OX conversion because of the increase of electron transport whereas the selectivity is determined by catalytic properties of TiO2 grains. TiO2 on Ti mesh exhibits higher selectivity than that on MWNT-PyPBI-TiO2-N2, which suggests that the surface structures of TiO2 on Ti mesh is different from that on MWNT-PyPBI-TiO2-N2. In addition, further increasing the TiO2 loading would increase the thickness of the film electrode which is not favorite for gas diffusion, and the ohmic resistance would increase. That's the reason that I did not prepare the film electrode with high TiO2 loading.