

2nd World Congress on Petrochemistry and Chemical Engineering

October 27-29, 2014 Embassy Suites Las Vegas, USA

Modified graphite electrode by polyaniline/tourmaline improves the performance of bio-cathode microbial fuel cell

Guangyi Zhang

Dalian University of Technology, China

Bio-cathode using microorganisms as catalyst can reduce MFC cost and sustain similar power output compared to noble metal catalysts. Thereby, looking for a cathode material which is high conductivity, good biocompatibility and even can stimulate and enhance activity of bio-catalyst is of great interest. In our research, characteristics of the tourmaline/polyaniline electrode (R3) were tested and compared with the polyaniline modified electrode (R2) and unmodified electrode (R1). The MFC with tourmaline/polyaniline modified electrode exhibited the best electrochemical performance, the power density of R3 was improved by 492.6% and 192.8% compared to R1 and R2 (54 mW/m² for R1, 138 mW/m² for R2 and 266 mW/m² for R3, respectively). When the external resistance was 800 Ω , output voltages of R1, R2 and R3 were kept at 0.20 ± 0.005 V, 0.26 ± 0.005 V and 0.37 ± 0.005 V, respectively. Cyclic voltammetry showed that reductive current of R3 was higher than those of R1 and R2, indicating that the cathode of R3 had the strongest catalytic activity due to the fact that tourmaline could help the interfacial electron transfer, and thereby facilitate the reduction of oxygen at the cathode. The tourmaline/polyaniline modified electrode had higher oxygen affinity for oxygen reduction and had the ability to adjust solution pH. Results give us a new revelation that a new tourmaline-modified electrode as base carrier for bacteria has been found, neither metals nor non-metallic catalyst, but a mineral that improves the performance of the MFC.

Biography

Guangyi Zhang is completing his PhD in School of Environmental Science and Technology, Dalian University of Technology. His main research interests are in the fields of wastewater treatment and microbial fuel cell as well as sustainable biomass exploitation. He has published more than 8 papers in reputed journals.

guangyi0409@163.com