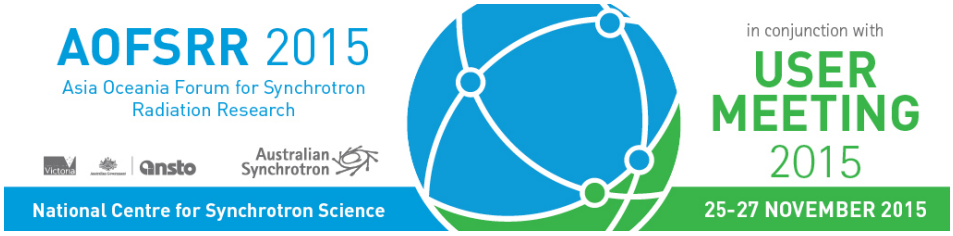

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Dynamic Self-organisation of Gluconobacter oxydans in Three-Dimensional Electron-transferring Network

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Electro-catalytic microorganisms are an essential component in bioelectro-catalytic systems such as microbial fuel cells. *Gluconobacter oxydans* has been widely used in such applications. In this study, we employed scanning electron microscopy, confocal laser scanning microscopy and ultra-small angle neutron scattering to investigate the dynamic self-organisation of *G. oxydans* cells into a three dimensional network within a hydrogel that had been constricted using linear poly(vinyl alcohol) and the crosslinker N-vinyl pyrroliodne (VP) (PVA-VP). It was found that the *G. oxydans* utilised the polymeric chains of the PVA-VP to form micro-wires that were capable of transferring electrons. The *G. oxydans* cells formed short chains on the micro-wires over a period of one hour, followed by these short chains undergoing self-assembly to form a three-dimensional network of electron-transferring micro-wires. The formation of this micro-wire network resulted in a twofold increase power generation bring obtained. This discovery has the potential to lead to the development of new, more efficient bioelectrocatalytic systems.

Keywords

Gluconobacter oxydans, microwires, poly(vinyl alcohol), N-vinyl pyrroliodne

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