Insights: Publications

Advancing the fundamental understanding and practical applications of photo-bioelectrocatalysis

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Photo-bioelectrocatalysis combines the natural and highly sophisticated process of photosynthesis in biological entities with an abiotic electrode surface, to perform semi-artificial photosynthesis. However, challenges must be overcome, from the establishment and understanding of the photoexcited electron harvesting process at the electrode to the electrochemical characterization of these biotic/abiotic systems, and their subsequent tuning for enhancing energy generation (chemical and/or electrical). This Feature Article discusses the various approaches utilized to tackle these challenges, particularly focusing on powerful multi-disciplinary approaches for understanding and improving photo-bioelectrocatalysis. Among them is the combination of experimental evidence and quantum mechanical calculations, the use of bioinformatics to understand photo-bioelectrocatalysis at a metabolic level, or bioengineering to improve and facilitate photo-bioelectrocatalysis. Key aspects for the future development of photo-bioelectrocatalysis are presented alongside future research needs and promising applications of semi-artificial photosynthesis.