Single pot seeded growth of iron-manganese oxide nanoflowers adsorbed onto carbon felt as anode in yeast-based MFC

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In this work, the growth of manganese oxide decorated iron oxide nanoflowers atop polyethylenimine (PEI) functionalized carbon felt (CF) via surface-bound iron particle seeds with and without the aid of a surfactant ligand in a one-pot aqueous solution at room temperature is explored. Widespread, uniquely shaped, rough nanocrystal growth was shown to attach and develop from the hydrophilic CF-PEI fibres' surface. Growth was achieved using a simple seed, initiator, reducer, and ligand mixture for 48 hours with minimal agitation. The structure and morphology of the iron-manganese oxide nanoflowers are examined through HR-SEM and EDS and the modified carbon felt anodic viability within microbial fuel cells (MFC) is determined through confirmation and analysis of the stimulation and maturation of yeast via CV and EIS. The exploration of the reaction mechanism and growth of the iron-manganese oxide nanoparticles through the addition of a surfactant ligand, sodium dodecylbenzenesulfonate (SDBS), – as well as the ratio of iron to manganese – show differing effects on the condition of yeast biofilm inhabitancy and viability and the resulting electrochemical effects.