Microbial acclimation to concentrated human urine in Bio-electrochemical System

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The aim of this study is to promote the gradual acclimation of bioelectroactive microorganisms in BES to concentrated human urine, and to assess different anode potentials and carbon materials in Microbial Electrolysis Cells (MEC). Human urine is highly concentrated in nutrients, representing more than 80% of the total N load and around 45% of the total P load in municipal wastewater. Separation of urine from other wastewater streams is an interesting option to keep these valuable nutrients concentrated, in order to develop a suitable nutrient recovery concept.

This work is integrated in the Value from Urine (VFU) concept, where phosphate is recovered from source segregated human urine through struvite precipitation and ammonia is recovered in a Bio-electrochemical System (BES). Enrichment of an anaerobic sludge community in urine-degrading-electroactive microorganisms was promoted in an Microbial Fuel Cell (MFC) operated with increasing concentrations of real human urine (after phosphorous removal, as struvite). This acclimated electroactive biofilm was used to inoculate the anode of MECs, aiming at H_2 and ammonia production in the cathode compartment. Different carbon modified anodes and defined anode potentials were assessed in terms of performance and microbial diversity of the developed electroactive biofilms.