

Regulation of 3-HP and 1,3-PDO production from glycerol in *E. coli*.

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Control of 3-hydroxypropionic acid and 1,3-propanediol productivity from glycerol was studied using genetically transformed *E. coli*. 3-HP and 1,3-PDO can be selectively produced by adjusting the NADH / NAD⁺ ratio within the cell. BES(bioelectrochemical system) enables to regulate intracellular redox state (NADH / NAD⁺) using electron transfer. In this study, we attempted to actively control the production of 3-HP and 1,3-PDO via bioelectrochemical control using heterogenetically modified *Escherichia coli*. Various electrochemical mediators were tested for this experiment, among those Neutral red was most suitable. As a result, the synthesis of 3-HP was enhanced by increasing the intracellular NADH / NAD⁺ ratio when the oxidation potential was given. In contrast when reduction potential was given, the ratio of NADH / NAD⁺ was decreased to induce the synthesis of 1,3-PDO whereas 3-HP synthesis can be suppressed. Accordingly, it produces effective platform chemicals selectively and provides indicator to detect redox changes in cells indirectly.