Semi-continuous in situ magnetic separation for enhanced extracellular protease production - modeling and experimental validation - DTU Orbit (07/02/2019)

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In modern biotechnology proteases play a major role as detergent ingredients. Especially the production of extracellular protease by Bacillus species facilitates downstream processing because the protease can be directly harvested from the biosuspension. In situ magnetic separation (ISMS) constitutes an excellent adsorptive method for efficient extracellular protease removal during cultivation. In this work, the impact of semi-continuous ISMS on the overall protease yield has been investigated. Results reveal significant removal of the protease from Bacillus licheniformis cultivations. Bacitracin-functionalized magnetic particles were successfully applied, regenerated and reused up to 30 times. Immediate reproduction of the protease after ISMS proved the biocompatibility of this integrated approach. Six subsequent ISMS steps significantly increased the overall protease yield up to 98% because proteolytic degradation and potential inhibition of the protease in the medium could be minimized. Furthermore, integration of semi-continuous ISMS increased the overall process efficiency due to reduction of the medium consumption. Process simulation revealed a deeper insight into protease production, and was used to optimize ISMS steps to obtain the maximum overall protease yield. Biotechnol. Bioeng. 2013; 110: 2161–2172. © 2013 Wiley Periodicals, Inc.

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