Self-assembly of Cellulosome-based Biosensor with a Cascaded Signal Amplification for Utilizing as Enzyme and Whole-cell Biosensor

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A simple and novel promising strategy is proposed for a biosensor with high sensitivity due to signal amplification based on self-assembled protein interactions. To construct the self-assembled biosensor, a cellulosome system, comprising Type I and Type Ⅱ dockerin-cohesin interactions with different specificity, from the anaerobic *Clostridia* bacterium was applied. To design the dockerin-cohesin interaction based biosensor system, we constructed a self-assembled unit (SA unit) containing a type I cohesin module was fused to a dockerin type Ⅱ module at the N-terminus and two type Ⅱ cohesin modules at the C-terminus. Additionally, as optical biosensors, a green fluorescence protein (GFP) that was fused to a type I dockerin module was used as the output detection signal. The self-assembled biosensor was highly sensitive and achieved detection levels of 128.1-fold over the control. These results suggest that the designed, self-assembled biosensor system may be a promising strategy for utilizing an enzyme and whole-cell based biosensor.