プログラム名：「豊かで安全な社会と新しいバイオものづくりを
実現する人工細胞リアクタ」
PM 名：野地博行
プロジェクト名：「つくる」人工細胞デバイス

委 託 研 究 開 発

実 施 状 況 報 告 書（成果）

平成２８年度

研究開発課題名：

Development of novel anti-biofouling reagents

研究開発機関名：

The University of British Columbia

研究開発責任者
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Abstract

In the first year of the program, we have explored natural diversity of acyl-homoserine lactonases (AHLs) for identify candidates for industrial application of anti-biofouling reagents (AHL-QQ enzymes). We have focused on lactonases in the metallo-beta-lactamase (MBL) superfamily because these enzymes tend to have broader substrate specificity compared to lactonases from other superfamily, which is ideal targets to generate multi-specific anti-biofouling reagents. We have conducted bioinformatics analysis of over 500 enzymes and experimentally characterize >30 enzymes for the ability to degrade diverse AHLs. We successfully identified an AHL-QQ enzyme with more than 100 degree thermostability. Second, we have initiated a collaboration with Ruth Schmitz-Streit (Kiel University) to characterize AI2-QQ enzymes to develop universal (Gram-negative and Gram positive) QQ enzymes. We have performed bioinformatics analysis of several QQ enzymes and synthesized these gene to characterize their functionality. We have also

1. Activities, Accomplishment and Findings

1-1. Performed bioinformatics characterization of AHL QQ enzymes in the MBL superfamily.
1-2. Performed experimental characterizations of >30 AHL qqenzymes.
1-3. Identified AHL-QQ enzyme with 100 degree thermostability and broad specificity.
1-4. Performed ancestral reconstruction of AHL-QQ enzymes and characterized predicted ancestral enzymes
1-5. The ancestral QQ enzymes showed similar catalytic activity but even higher thermostability (>100 degree).

1-6. Performed bioinformatics characterization of AI-2 QQ enzymes.
1-7. Established assay methods and biosensor for AI-2 QQ enzymes.

2. Outreach, Events and Other Activities

None