Functional Expression of the Engineered Lipase PanDlidG₃ in *E. coli* with Potential Industrial Applications in Organic Media Catalysis

**Véras, I. C.¹; Morato, A. E.¹; Soares, T. R. J.¹; Sadoyama, K.K.¹; Oliveira, I. N.¹; Mascarenhas, A.²; Ferrão-Gonzales, A. D.³; Moreau, V. H.¹,³**

¹Dep. de Biointeração – ICS – Universidade Federal da Bahia (UFBA), Bahia, Brazil  
²Dep. de Química Analítica – IQ - Universidade Federal da Bahia (UFBA), Bahia, Brazil  
³Núcleo de Biotecnologia (NuBiotec), Faculdade de Tecnologia e Ciências (FTC), Bahia, Brazil

Enzymatic catalysis is a promise technology for many industrial application as food and energy industries. Specially, in the biodiesel production, enzymes can act in cleaner processes when compared to the inorganic catalysis allowing, in addition, the use of low-cost feed stocks. However, enzymatic catalysis for the production of biodiesel is still considered to be expensive, mainly due to the cost of the catalysts production and its small catalytic efficiency in organic medium containing triacylglycerol and methanol as solvents, since most of lipases used are developed to be used in emulsified media rather then organic ones. This work aims to optimize the process for the heterologous expression of functional lipases in high cell density systems, using *E. coli* as vector. Additionally, a lipase mutant previously engineered to high catalytic performance in organic media were expressed and evaluated in high cell density system. Mutation consisted in deletion of the lipase lid responsible to the interfacial activation of the enzyme - needed for the catalytic activity in water/oil interface - and substitution by three glycine residues. As engineered mutant was designed from *Pseudozyma antarctica* lipase B, it received the name PanDlidG₃. Immobilization of produced lipases where performed in many synthetic and natural resins in order to evaluate their possible use as heterogeneous catalyst. Production of lipases in high expression heterologous systems and with high catalytic performance in organic medium are of special interest for many industries, including biodiesel production one, since this process allow the use of low-cost feed stocks, as high acidity residual oils, generate less residues and require less upstream processes for purification of biodiesel.

Supported by FAPESB and CNPq

Keywords: Lipase, engineered mutant, biodiesel, organic media