Abstract

Hemoproteins play a lot of important roles within the living organism. One of these being the sensor function – heme sensor proteins are able to detect the changing concentration of heme in organisms. Heme itself serves as a signalling molecule for these proteins. Heme-based gas sensor proteins use a biatomic gas molecule as a signalling molecule. Signal transduction begins once the gas molecule is bound to the heme molecule which is already tightly bound in the protein sensing domain. Both these types of signalling regulate a number of physiological processes in the prokaryotic and eukaryotic organisms.

The theoretical part of the bachelor thesis summarizes recent scientific studies on heme sensor proteins, while the experimental part focuses on the properties of a specific model sensor hemoprotein. A direct oxygen sensor from *E. coli* (*Ec*DOS) was selected as a model protein. Furthermore, the thesis deals with a truncated form of the *Ec*DOS protein, an isolated sensor domain with a PAS structure (*Ec*DOS-PAS). The experimental part aimed at expressing and isolating of both mentioned proteins from *E. coli* BL-21 (DE3) cells. Finally, both the *Ec*DOS and *Ec*DOS-PAS proteins were preliminarily characterised and their properties compared. The yield of the *Ec*DOS-PAS was several times higher than the yield of the *Ec*DOS. The purity of the isolated *Ec*DOS protein preparation was approximately 85–90 %, while the purity of the final *Ec*DOS-PAS protein preparation was 99 %. The Soret bands and Q-bands α and β of the absorption spectra of the *Ec*DOS and the *Ec*DOS-PAS proteins in the UV/VIS region were found at similar wavelength values.

Key words: heme, heme sensor proteins, oxygen sensors, signal transduction

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