Abstract

Oxidative processes are an inseparable part of the life of almost all living organisms. They help to maintain homeostasis but they can also stand behind various dysfunctions or diseases. Therefore, an effective method for monitoring oxidative processes in biosamples is an essential tool for medicine, agriculture, and food industry. In this thesis, an overview of available methods for monitoring oxidation in biosamples with a special focus on biological autoluminescence (BAL) is provided. This thesis uses the term BAL to encapsulate various synonyms including the commonly used term ultra-weak photon emission. BAL correlations with various physical, chemical, and biological factors (as original research and an overview from other authors) are also presented. Specifically, the relationships between spontaneous BAL of yeast *Saccharomyces cerevisiae* and the selected physical and chemical parameters (pH, oxygen partial pressure, and cell concentration) during cell growth were established. Additionally, the correlation of BAL intensity from yeast cells or protein bovine serum albumin (BSA) and the number of reactive oxygen species (ROS) that originated as a result of the Fenton reaction were measured. Physical enhancement of BAL from BSA by pulsed electric field was also studied and a basic reaction mechanism of electrogenerated ROS in protein sample leading to BAL was proposed. This work supports BAL employment as a non-invasive monitoring and diagnostic method in various important fields.