

# Macroscopic investigations of meat ageing

Elena Prokopyeva<sup>1\*</sup>, Pavel Tománek<sup>1</sup>

<sup>1)</sup> Brno University of Technology, Brno, Czech Republic

\*) E-mail: xproko24@stud.feec.vutbr.cz

The study of biological tissues is of great interest to those dealing with the development of optical medical technologies and food control. The variety of methods and instruments for quality control and rapid measurements in food industry has rapidly expanded. Electrical and optical sensing methods for real-time inspection of food and agricultural products can present solutions to problems of speed, accuracy, and consistency that are related to inspection for product quality and safety based on physical and chemical characteristics.

In this paper we present investigation of electrical [1] and optical characteristics of meat. We have measured changes of impedance with growing frequency from 20 Hz up to 1 MHz for pork and chicken meat samples using the two-electrode measurement setup with impedance/gain-phase analyser HP 4284A. Electrodes were prepared from stainless steel needles (diameter of 0,5 mm). The distance between electrodes as well as the depth of their incision was controlled. Also we have studied the dependence of meat fibers orientation relatively to the direction of electrical field (parallel or perpendicular) and provided the experiment with fresh and frozen samples (Figure 1).

Among different optical characteristics we have chosen scattering of light. In biological material random multiple scattering may change direction of propagation, phase of light or polarization state [2]. We have used the experimental setup in transmitted light. Light from the laser ( $\lambda = 635$  nm) passed through the polarizer and sample – slice of 1mm thick pork meat. Polarization shift is observed for the experiments with 24 hours difference (Figure 2).

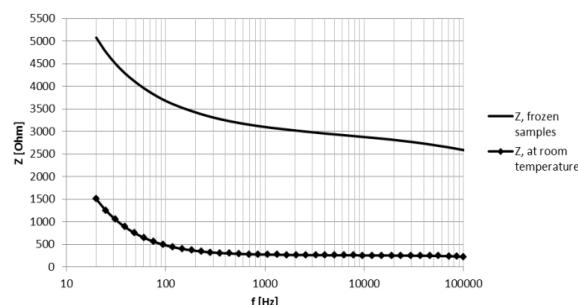


Figure 1: Impedance of chicken meat samples depending on freezing

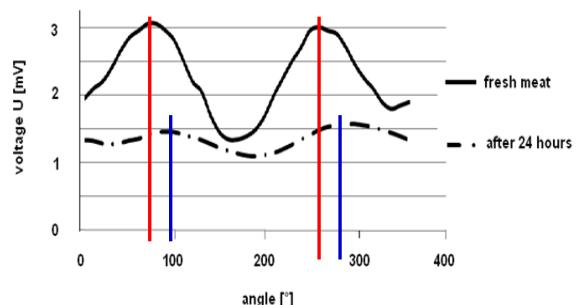


Figure 2: Polarization shift with ageing

## References.

- [1] D. Miklavič, N. Pavšelj, F. X. Hart, Electric properties of tissues, *Wiley Encyclopedia of Biomedical Engineering*, 12, ISBN: 978-0-471-74036-0 (2006).
- [2] H. M. Abubaker, P. Tománek, L. Grmela, Measurement of dynamic variations of polarized light in processed meat due to aging, *Proc. SPIE*, vol. 8306, paper ID 8036O01 (2011).