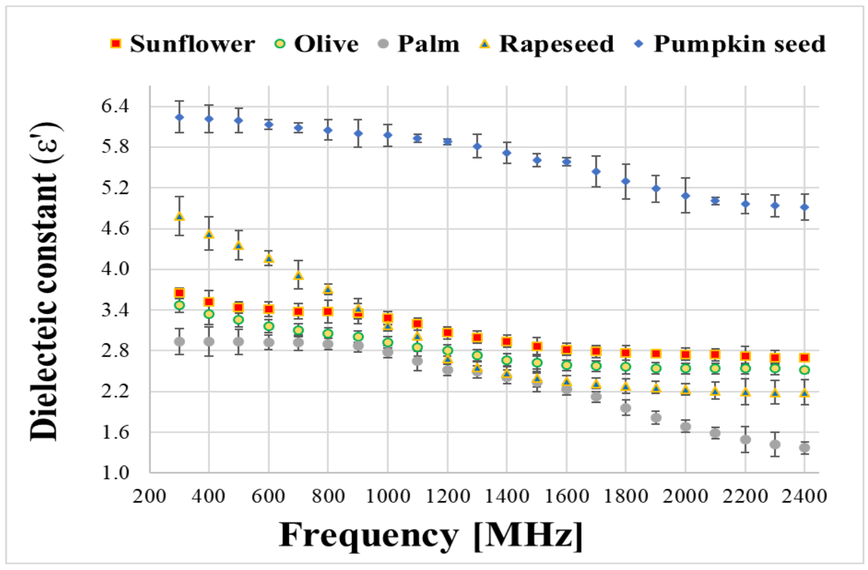
DIELECTRIC PARAMETERS OF VEGETABLE OILS DURING STORAGE

Gabriella Bitó[1], Balázs Lemmer[2], Zoltán Jákói[1], Sándor Beszédes[1]

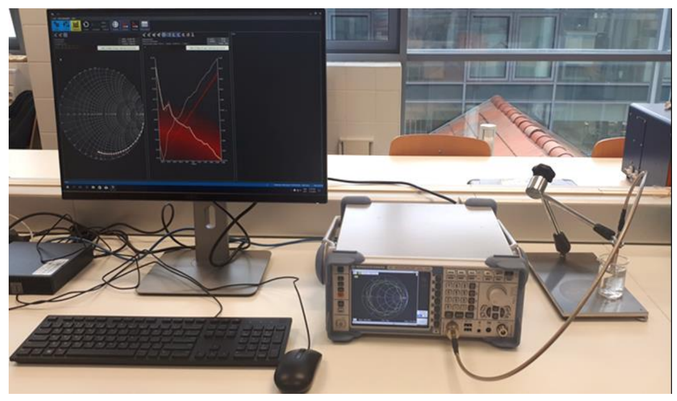
[1]Department of Biosystems Engineering, Faculty of Engineering, University of Szeged, Szeged, HUNGARY
[2]Department of Food Engineering, Faculty of Engineering, University of Szeged, Szeged, HUNGARY
e-mail: beszedes@mk.u-szeged.hu

Vegetable oils play an important role in a healthy diet. But, during storage, beside their composition, many environmental factors (light, oxygen, temperature) accelerate lipid oxidation, resulting in rancidity, off-flavours, and a reduction of shelf life. When vegetable oils are used for cooking, oils undergo oxidative and thermal degradation, leading to the formation of harmful compounds such as trans fatty acids or aldehydes, which decrease the nutritional quality. Therefore, development of rapid, non-destructive but reliable measurement methods for testing quality of vegetable oils is an important area of R&D activities. These requirements are met by the specific characteristics of dielectric measurements.

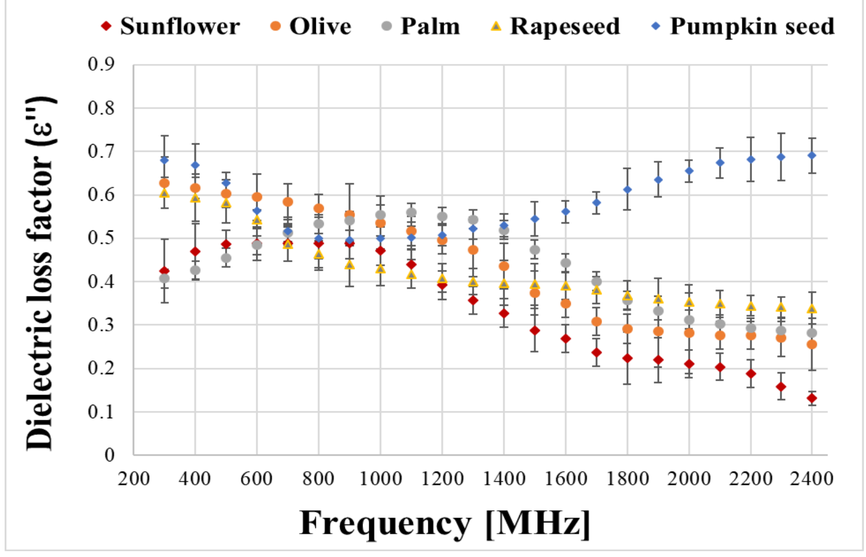
Dielectric behavior of sunflower-, olive- palm-, rapeseed and pumpkin seed oil was analysed in the frequencies of 200-2400 MHz (Speag DAK 3.5), investigating the effect of heating and storage on the dielectric constant and loss factor. It was found, that dielectric constant and loss factor increased characteristically in the frequency range 300-1200 MHz during storage. The dielectric parameters showed linear correlation with the variation of the peroxide number. The chemical changes occurring in oils during storage—characterised by peroxide value and iodine value—and the variations in the trend of the relationship between the dielectric constant and loss factor at a given frequency (transition to linearity) show good agreement.



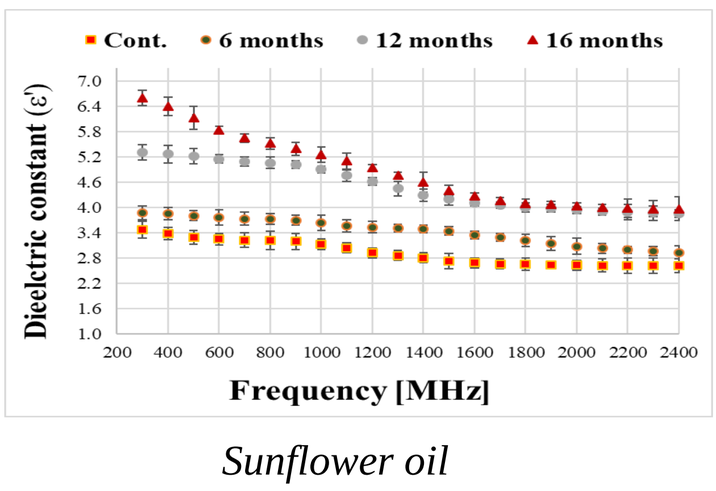
Dielectric constants of different vegetable oils



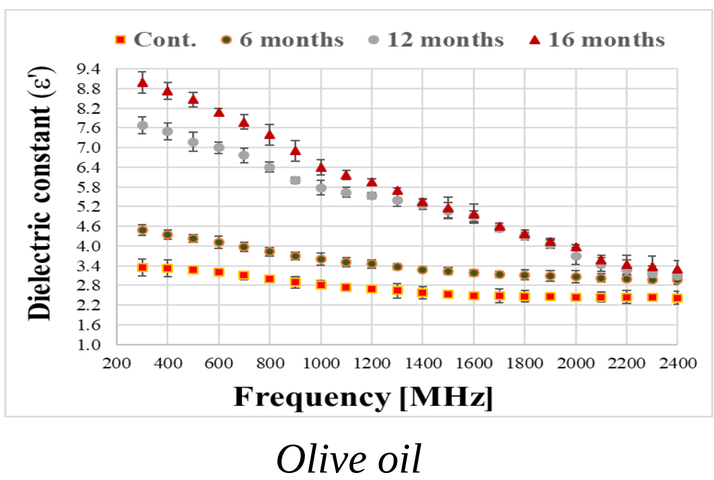
DAK 3.5 OECP with ZVL3 VNA



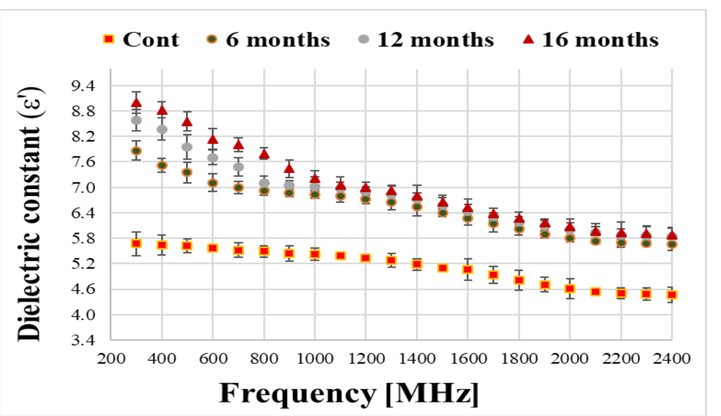
Dielectric loss factor of different vegetable oils



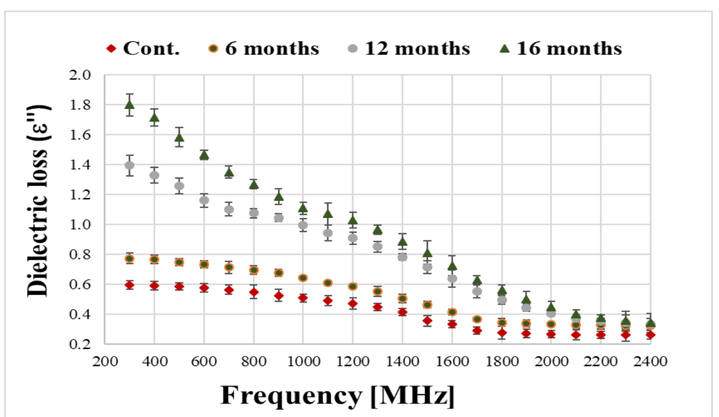
Sunflower oil



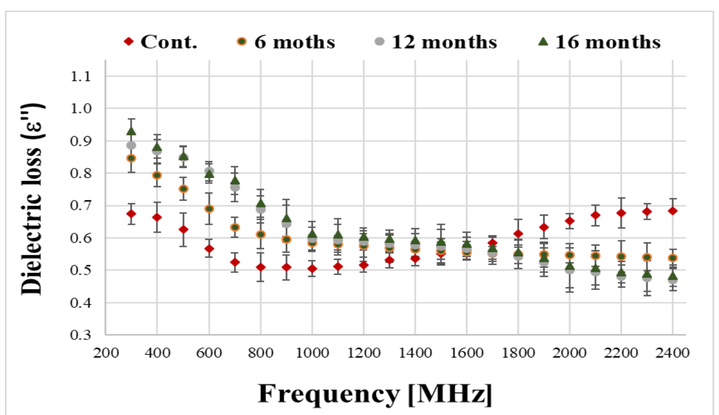
Olive oil



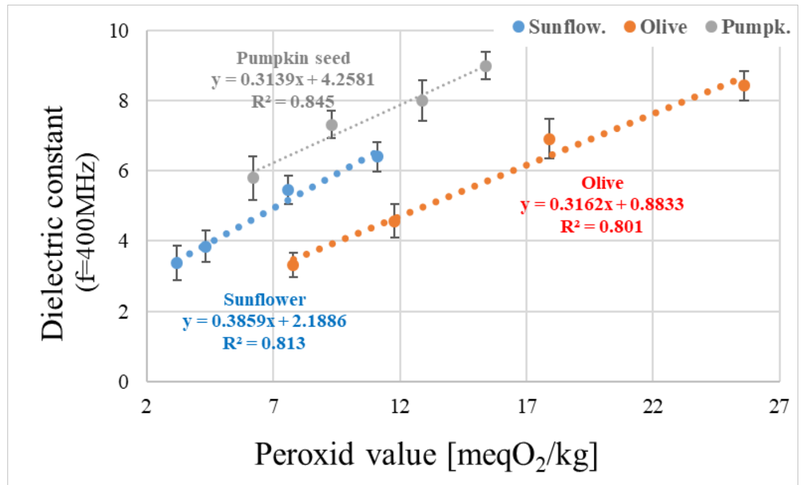
Pumpkin seed oil



Olive oil



Pumpkin seed oil



Correlation of PV with ε'