

28th International Symposium on Analytical and Environmental Problems



MONITORING THE ACID COAGULATION PROCESS OF MILK BY DIELECTRIC MEASUREMENT

Réka DOBOZI¹, Zoltán JÁKÓI², József CSANÁDI¹, Sándor BESZÉDES²

¹University of Szeged, Faculty of Engineering Department of Food Engineering, Szeged, H-6724 Mars ter 7, Hungary

²University of Szeged, Faculty of Engineering Department of Biosystems Engineering, Szeged, H-6725 Szeged, Moszkvai krt. 9, Hungary

E-mail: dobozireka2000@gmail.com



ABSTRACT

The application of dielectric measurement techniques is becoming increasingly widespread in several fields of science and industry, due to its simple, quick and accurate usability. The dielectric behavior of almost all materials largely depends on – among other factors – their physical structure and chemical composition, and when these properties change even to just a relatively small extent, it can be detected by monitoring appropriate dielectric parameters. In our work, we have investigated the process of acid coagulation of milk to see whether a correlation can be established between the rheological behaviour of milk and two dielectric parameters, namely the dielectric constant (ϵ'), and the dielectric loss factor (ϵ'').

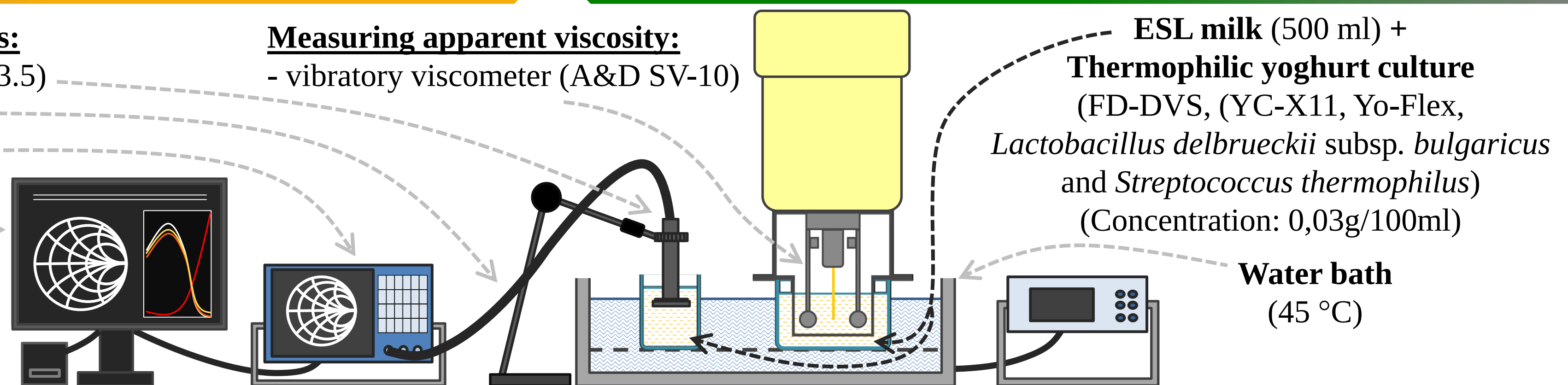
MATERIALS AND METHODS

Measuring dielectric parameters:

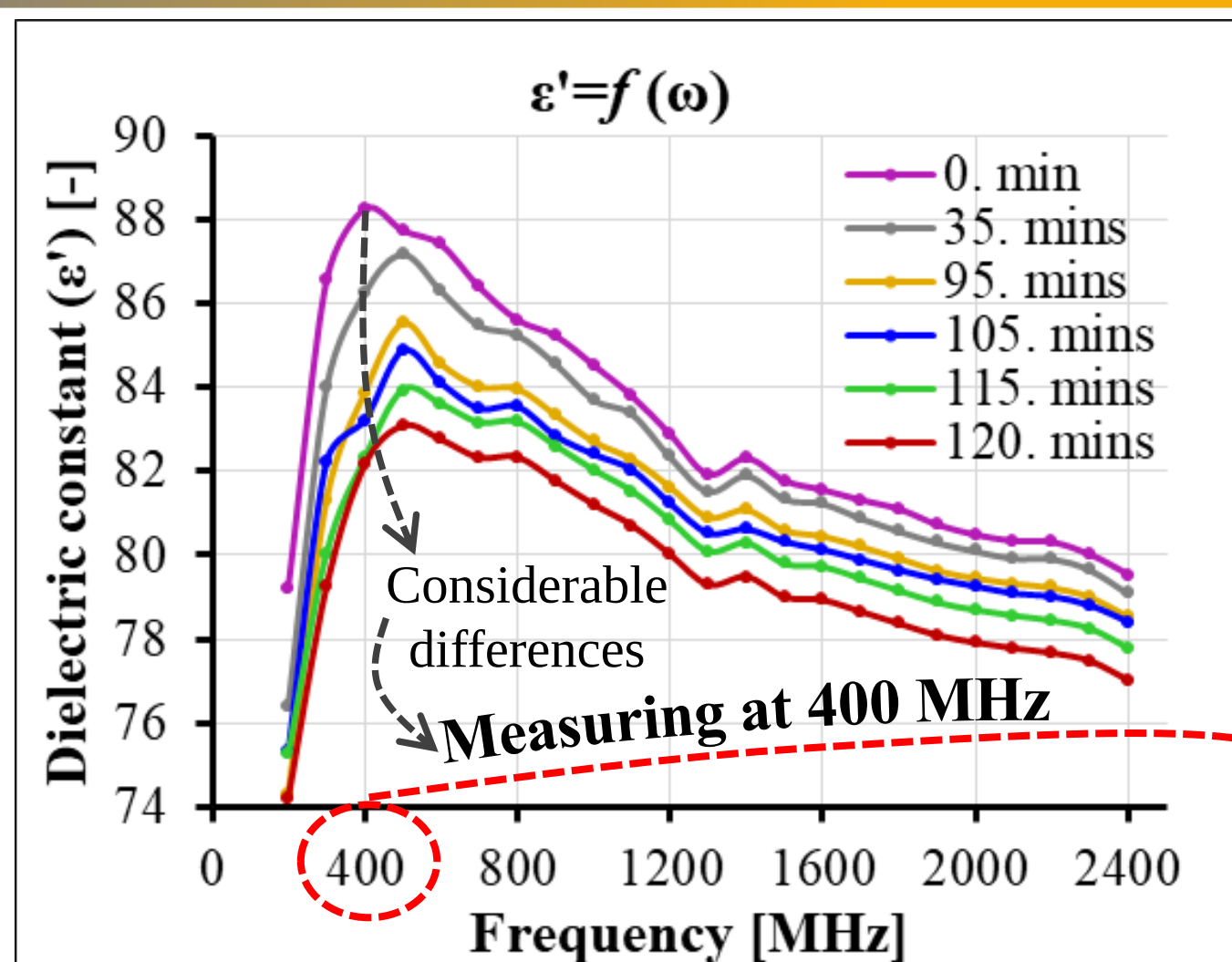
- dielectric sensor (SPEAG DAK 3.5)
- open-ended 50 Ω coaxial cable
- vector network analyzer (Rhode&Schwarz ZVL-3)
- DAK software

Measuring apparent viscosity:

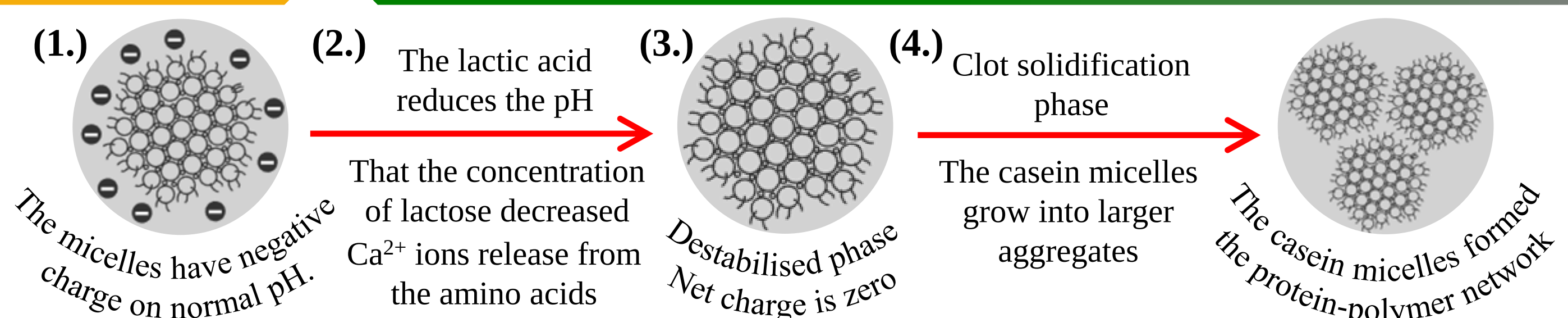
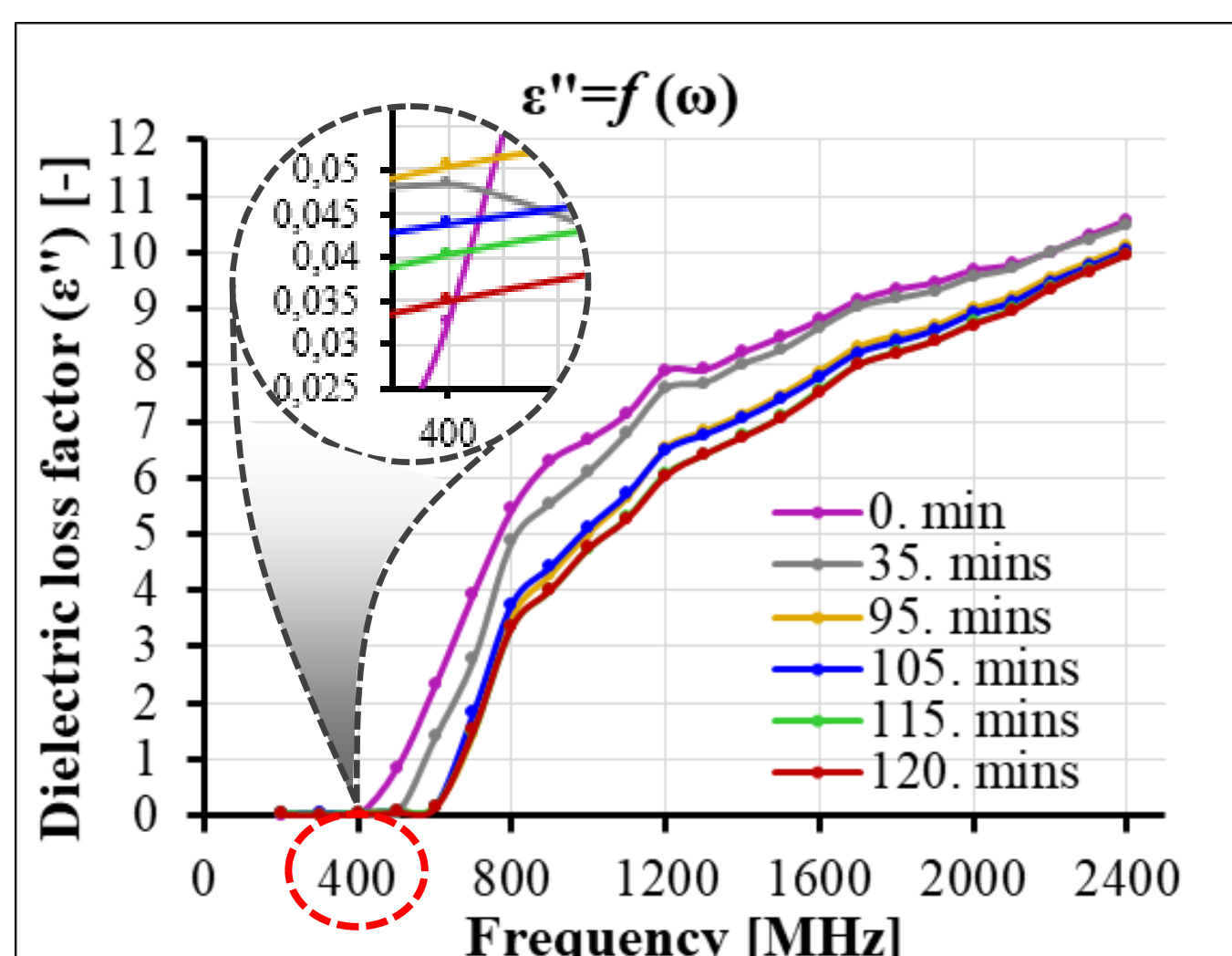
- vibratory viscometer (A&D SV-10)



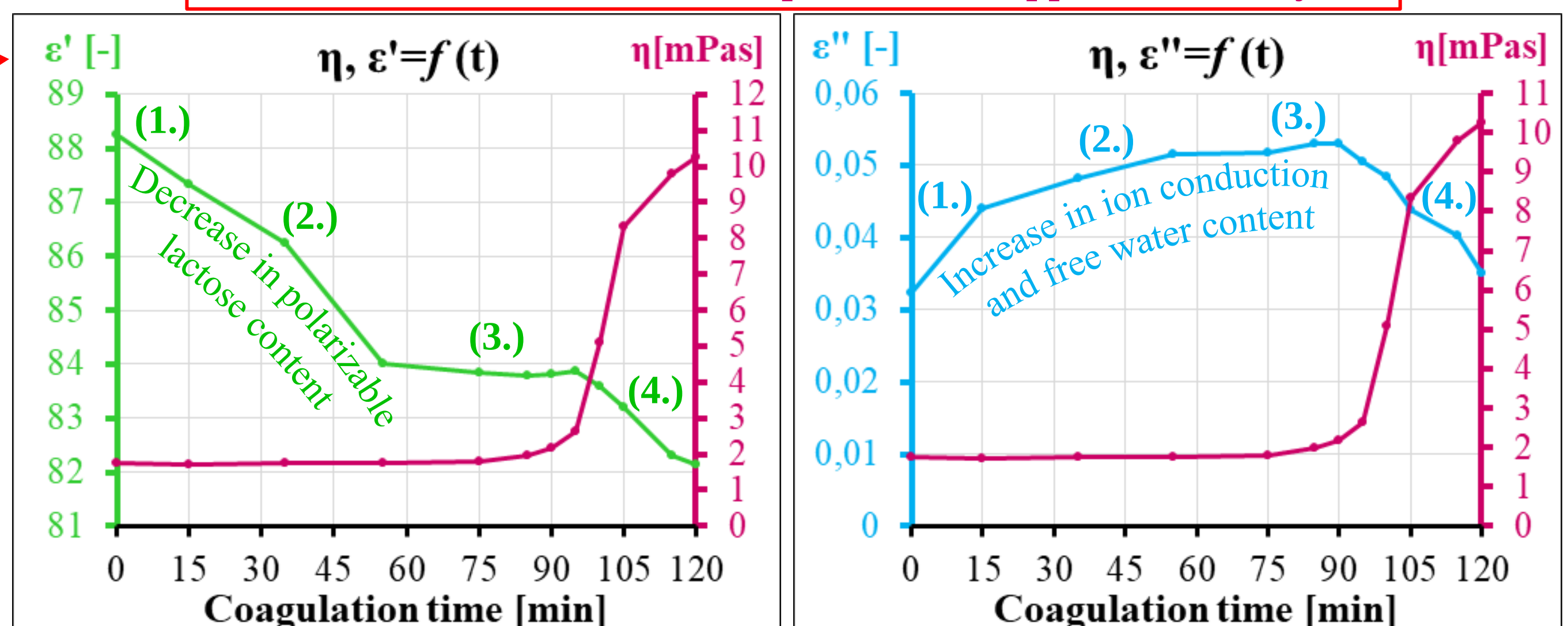
RESULTS AND DISCUSSION



The change in dielectric parameters in the function of frequency at different times of the coagulation process



ϵ' – 0-50 min: decrease → 50-90 min: stagnation → starting decrease
 ϵ'' – 0-90 min: saturation-curve-like slope → starting decrease
 → at a similar rate with a steep increase in apparent viscosity



Our experimental results revealed that the process of acid coagulation of milk can be monitored by the measurement of the dielectric constant and loss factor, and that these two parameters have a strong correlation with the changes in the apparent viscosity of the milk when it undergoes the coagulation process.

ACKNOWLEDGEMENTS

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