



# Mendeleev 2024

XIII International Conference on Chemistry  
for Young Scientists

# BOOK OF ABSTRACTS



St Petersburg  
University

# **BOOK OF ABSTRACTS**

**XIII International Conference on Chemistry  
for Young Scientists “MENDELEEV 2024”**

St Petersburg, Russia  
September 2-6,  
2024

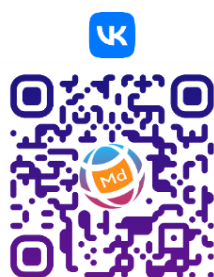
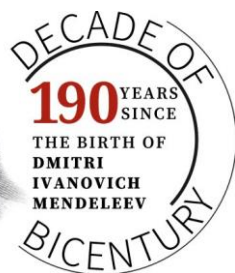
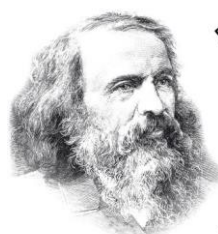
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Abstracts are presented in the author's edition with minimal technical corrections.

## DEDICATED TO



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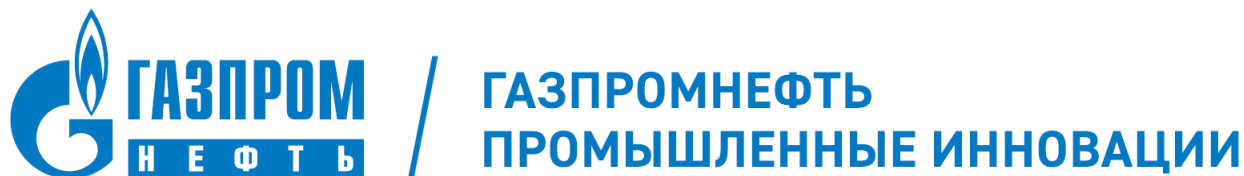
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# APPLICATION OF RAMAN SPECTROSCOPY TO RESEARCH IN THE STRUCTURE OF BOVINE SERUM ALBUMIN IN FILMS

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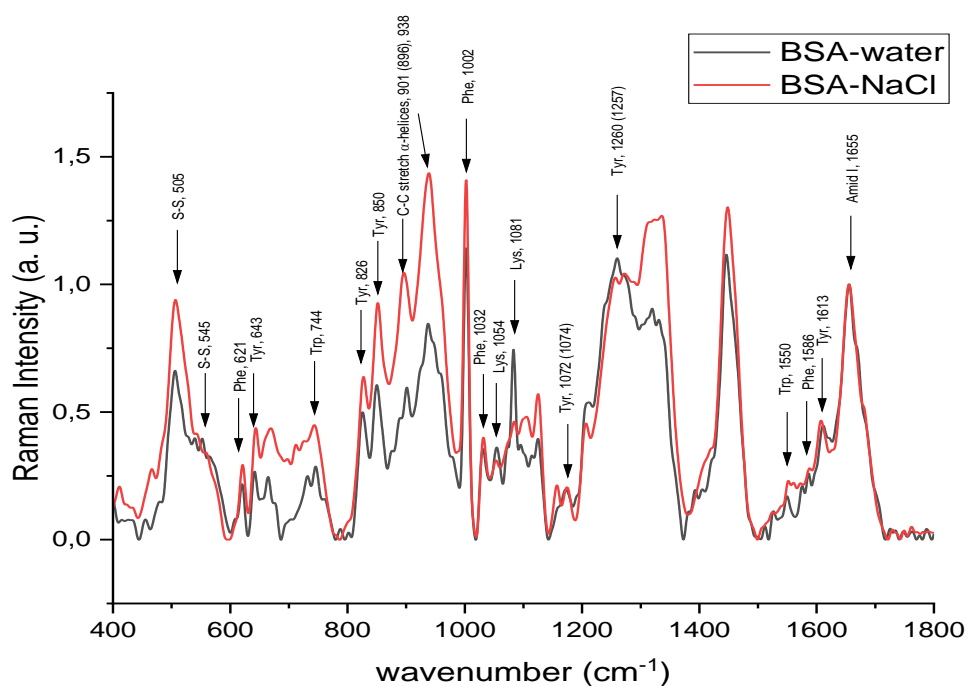
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Raman spectroscopy have been used to understand the structure and conformational changes of proteins. The advantages of this method are a small amount of sample, the ability to study multicomponent systems and complex structures, the negligible contribution of water to the spectrum, and the use of the substance in liquid or solid phase. A Raman spectrum of a protein provides unique signatures for various secondary structures like helices, beta-sheets, turns, random structures, etc., and various amino acid residues such as tyrosine, tryptophan, and phenylalanine [1].

In this work, the structure of bovine serum albumin (BSA) in films obtained from aqueous and 0.15 M NaCl solution is investigated by Raman scattering. The obtained spectra are shown in Figure 1. Vibration bands of different amino acid residues, including aromatic residues, can be identified. By the position and intensity of certain bands, we can judge the polarity of the environment of several amino acid residues. In particular, a decrease in the intensity of the band corresponding to Phe at 621  $\text{cm}^{-1}$  occurs with increasing hydration. The ratio of the intensity of doublet ( $I_{1360}/I_{1340}$ ) changes with the polarity of the solvent. When Trp is more solvent-accessible,  $I_{1360}/I_{1340} < 1$ . Also, the intensity ratio of 850  $\text{cm}^{-1}$  to 830  $\text{cm}^{-1}$  (Tyr) should be considered a marker of the hydrophilic/hydrophobic environment around the residue [1]. The Raman spectra also show clearly the amide I band, which can be decomposed to reveal the contributions of vibrations of the peptide group involved in various forms of protein secondary structure. By deconvolution of this band, we obtained 65% alpha helices for both samples, 1 and 4% beta sheets for BSA in water and NaCl, respectively. These results are in agreement with the literature data.



**Figure 1.** Baseline-corrected Raman spectra of BSA films prepared from the water and 0.15 M NaCl solutions.

## References

[1] *Spectrochimica acta. Part A.* **2021**, 258, 119712

## Acknowledgements

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