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# Spectral studies of oligoribonucleotide-based drugs

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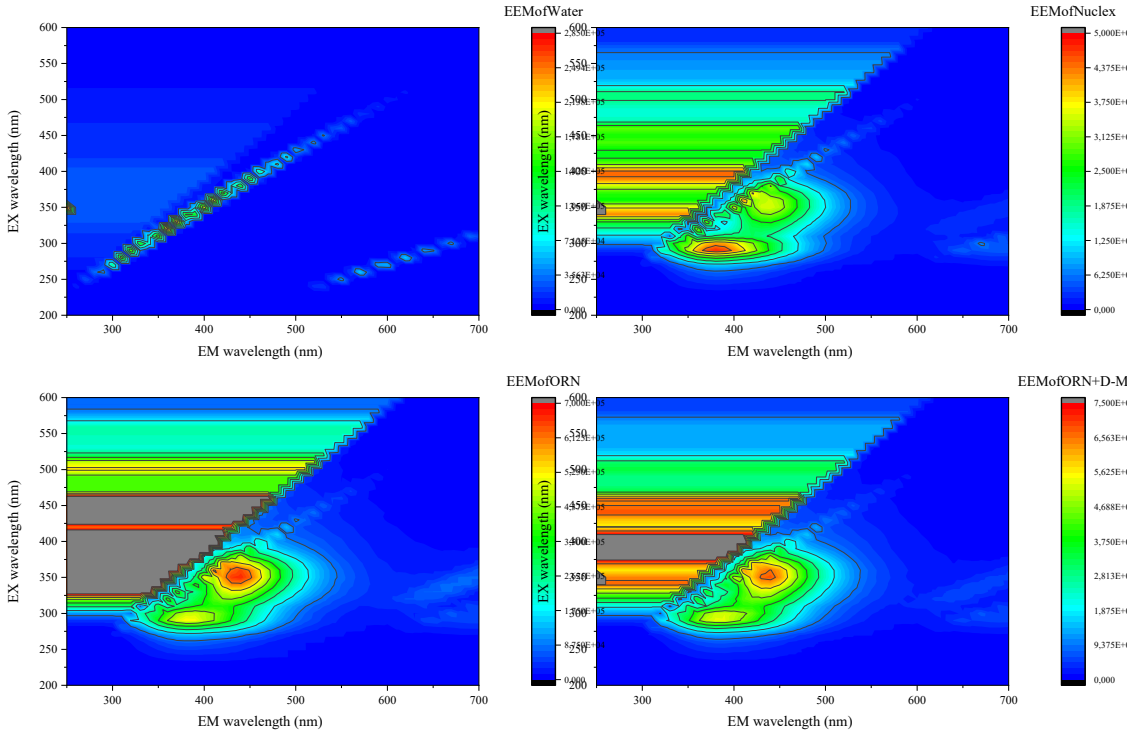
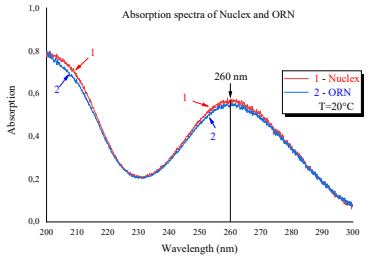
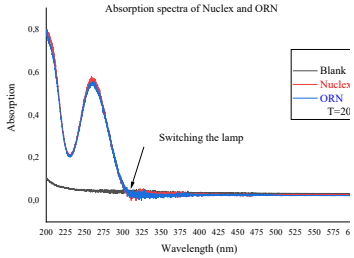
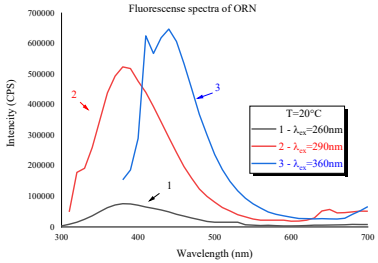
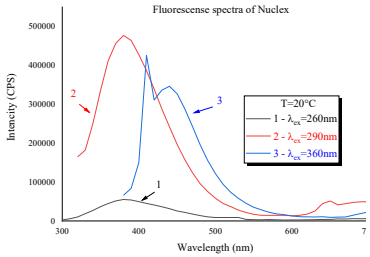


**Abstract:**

The biological activity of oligoribonucleotide (ORN) based drugs studied very actively at the same time. However, at the same time, it is of great importance to study their biophysical particularly spectral properties.

As the samples, we worked with the "Nuclex", pharmaceutical drugs that are based on a combination of ORN and alcohol sugar D-mannitol (D-M), and the main components of these drugs (active substance - ORN and excipient - D-M). We have measured the UV-Vis absorption, fluorescence, and fluorescence excitation spectra of drugs and their components dissolved in the water under the room temperatures.

In the course of our research, we found the autofluorescence centers of Nuklex and identified the possibility of forming complexes between ORN and D-M.

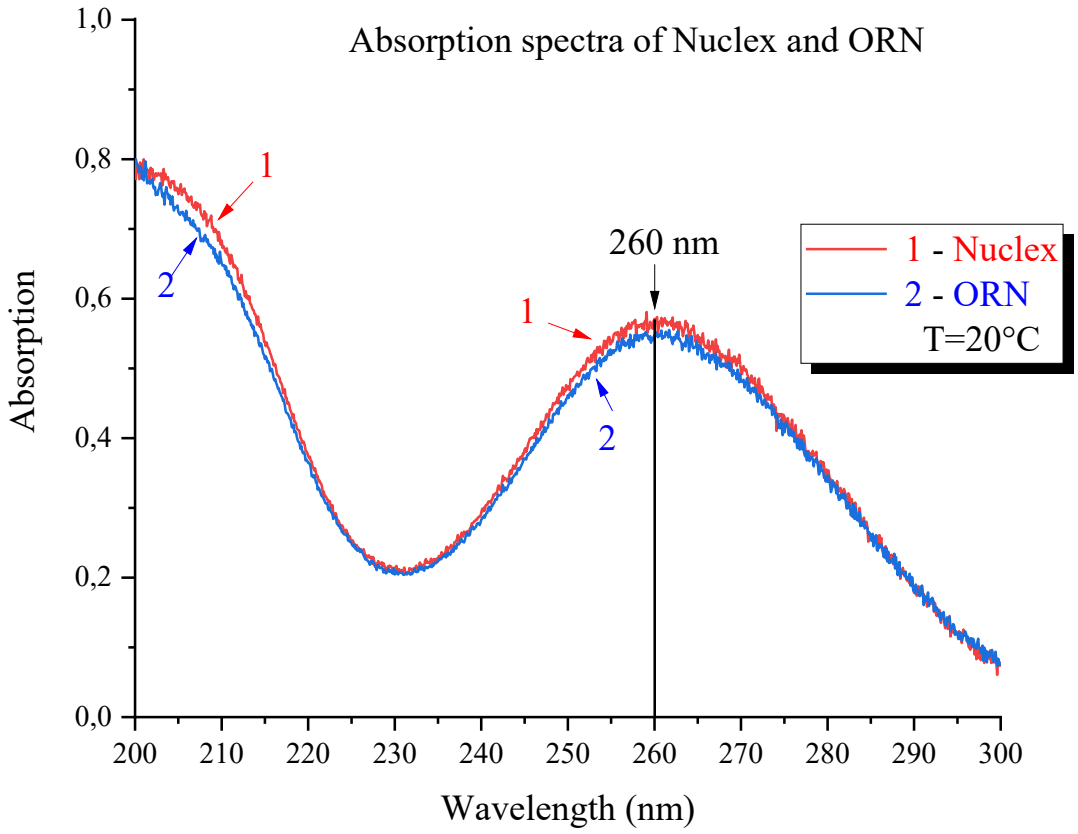
**Keywords:** oligoribonucleotide-based drug; D-mannitol; spectroscopy; absorption, fluorescence; autofluorescence.

# Introduction

Recently, oligoribonucleotide based drugs have become increasingly popular. ORNs have a wide spectrum of biological properties. They are used as antiviral drugs and have antitumor and anti-inflammatory effect. They impact on both RNA and DNA-containing viruses and stimulate the innate antiviral immunity system. The biological activity of such drugs studied very actively at the same time. However, at the same time it is of a great importance to study their biophysical particularly spectral properties.

As the samples, we worked with the "Nuclex", pharmaceutical drugs which are based on a combination of ORN and alcohol sugar D-mannitol, and the main components of these drugs (active substance - ORN and excipient - D-M). We have measured the UV-Vis absorption, fluorescence, and fluorescence excitation spectra of drugs and their components dissolved in the water under the room temperatures. The UV-VIS absorption spectra were conducted at room temperature with a Specord 210 Plus two-beam spectrophotometer (Analytik Jena). Spectrum fluorescence and fluorescence excitation under the room temperatures were recorded with a Fluoromax-Plus spectrofluorimeter (HORIBA Instruments Inc.). For water solutions a degassed bidistillate was used.

# Results and discussion

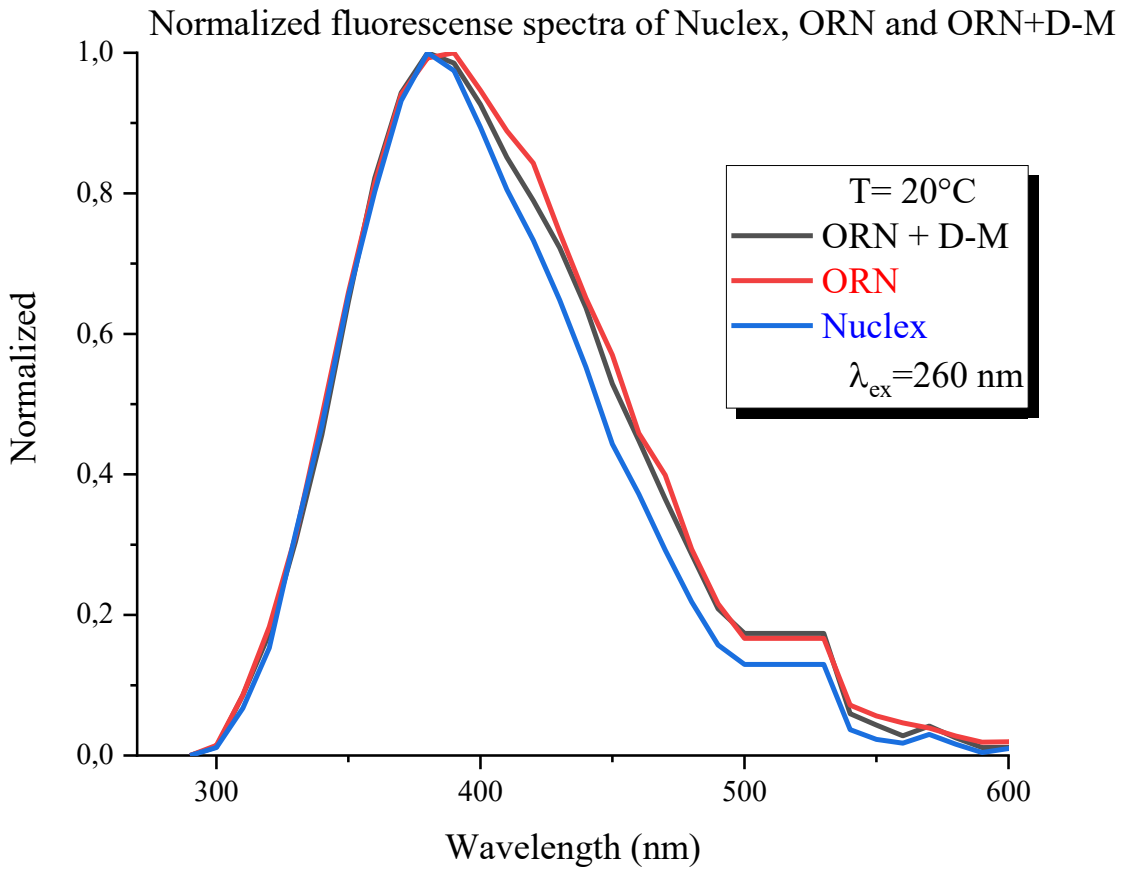



Comparison of the spectra of Nuclex and its components, the presence of ORN was shown.

Control of the ORN concentration was performed by measuring the absorption spectra to a maximum of 260 nm.

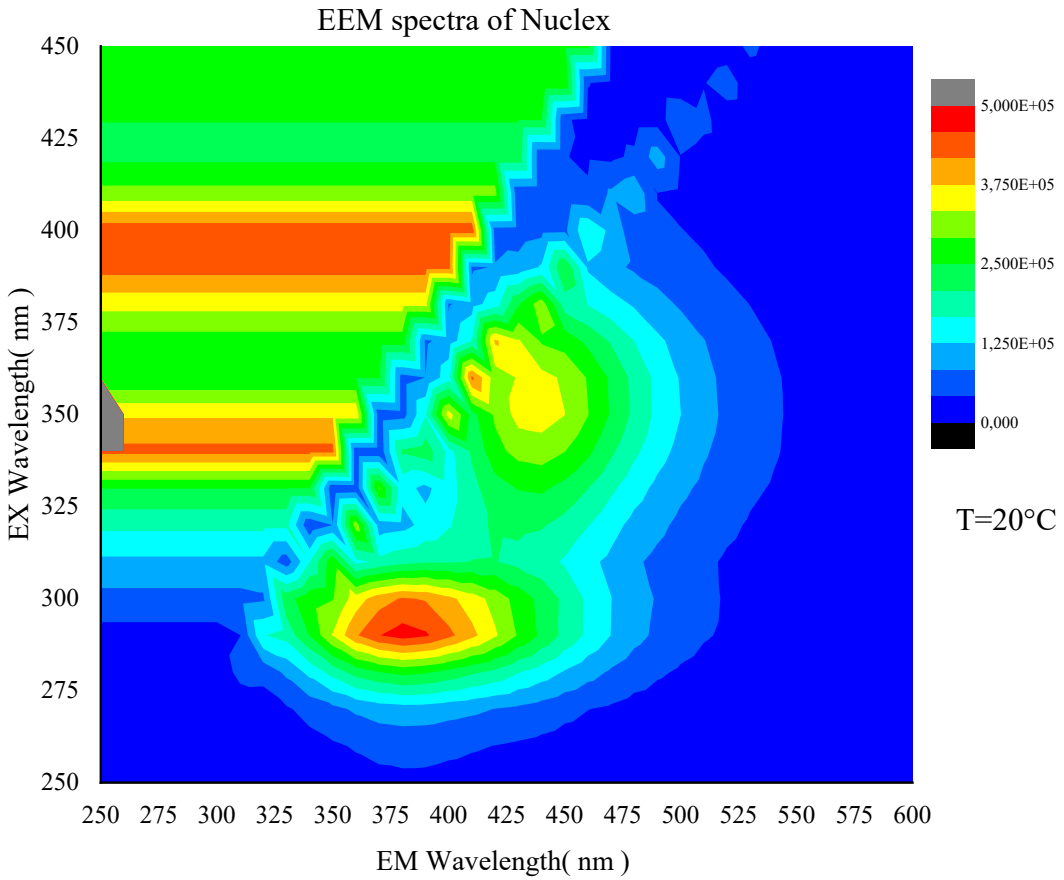
The shape of the spectrum and the position of the absorption peak of ORN and Nuclex coincide and correspond to the absorption spectrum of adenosine.

# Results and discussion




Excitation of ORN and Nuclex at a wavelength of 260 nm, we obtained a wide range of fluorescence in the region of 280-550 nm with a maximum at the position of 380 nm.

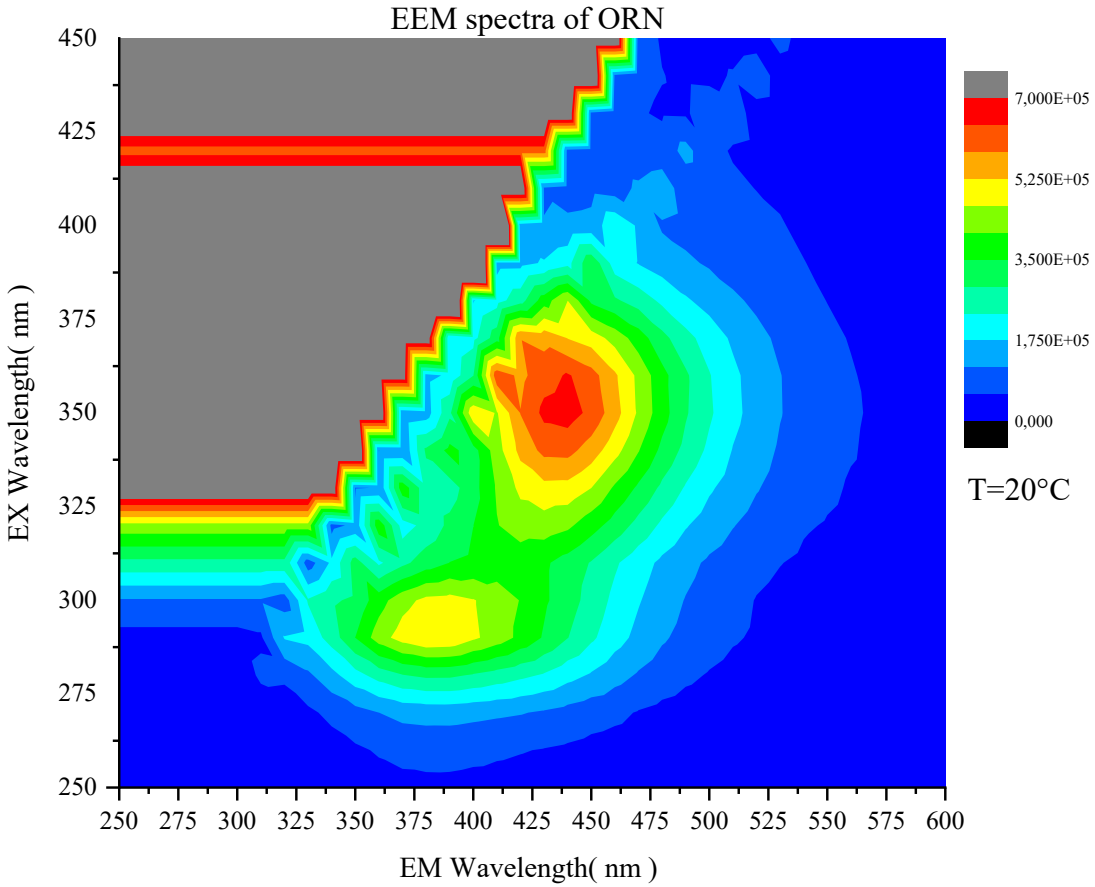
# Results and discussion




While measuring the spectra fluorescence and fluorescence excitation of the Nuclex and ORN, two large emission centers were detected with a maximum luminescence of 380 nm at an excitation wavelength of 290 nm (the emission of 310-550 nm) and a maximum of 440 nm, with the excitation of 360 nm (the emission of 350-610).

In the Nuklex, the excitation peak of 290 nm is significantly dominated by the intensity of the excitation peak of 360 nm.

# Results and discussion

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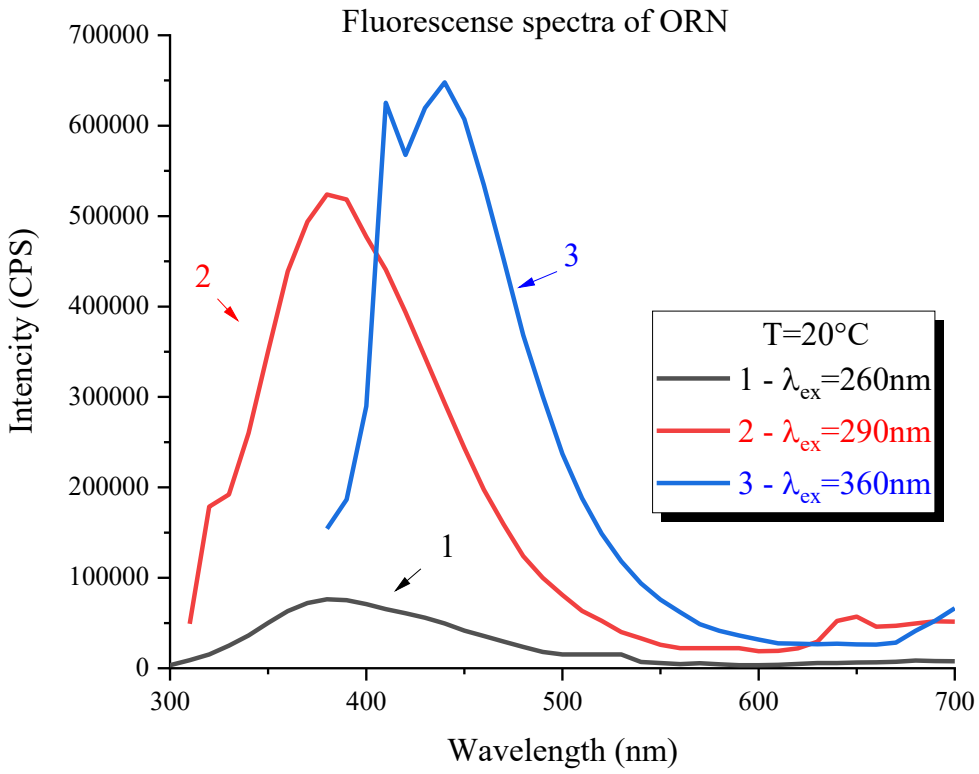


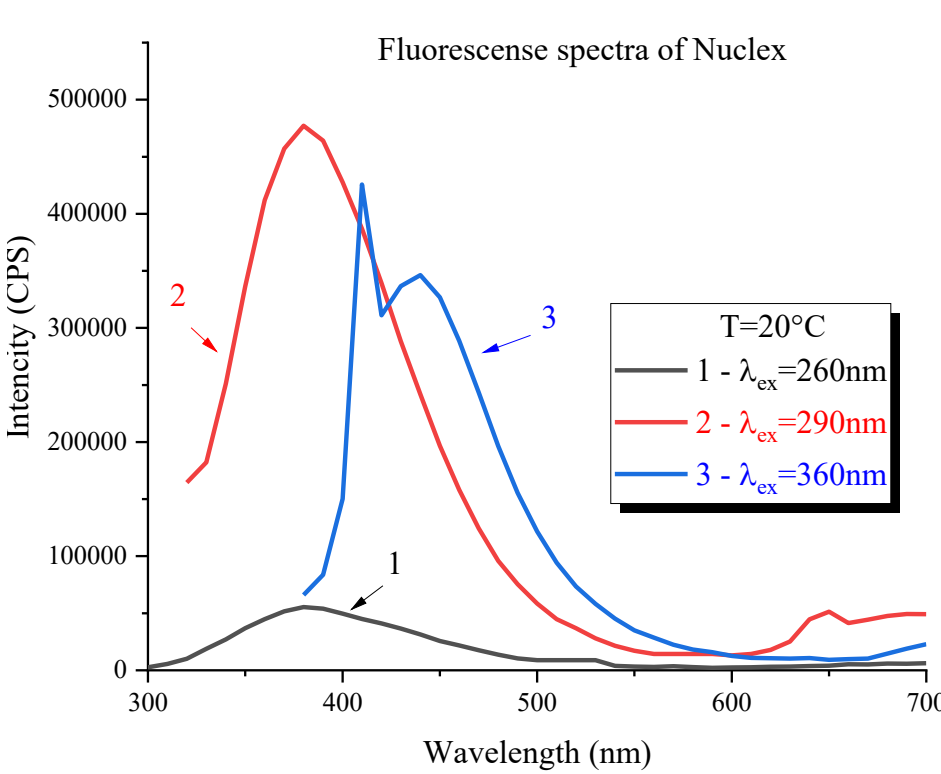

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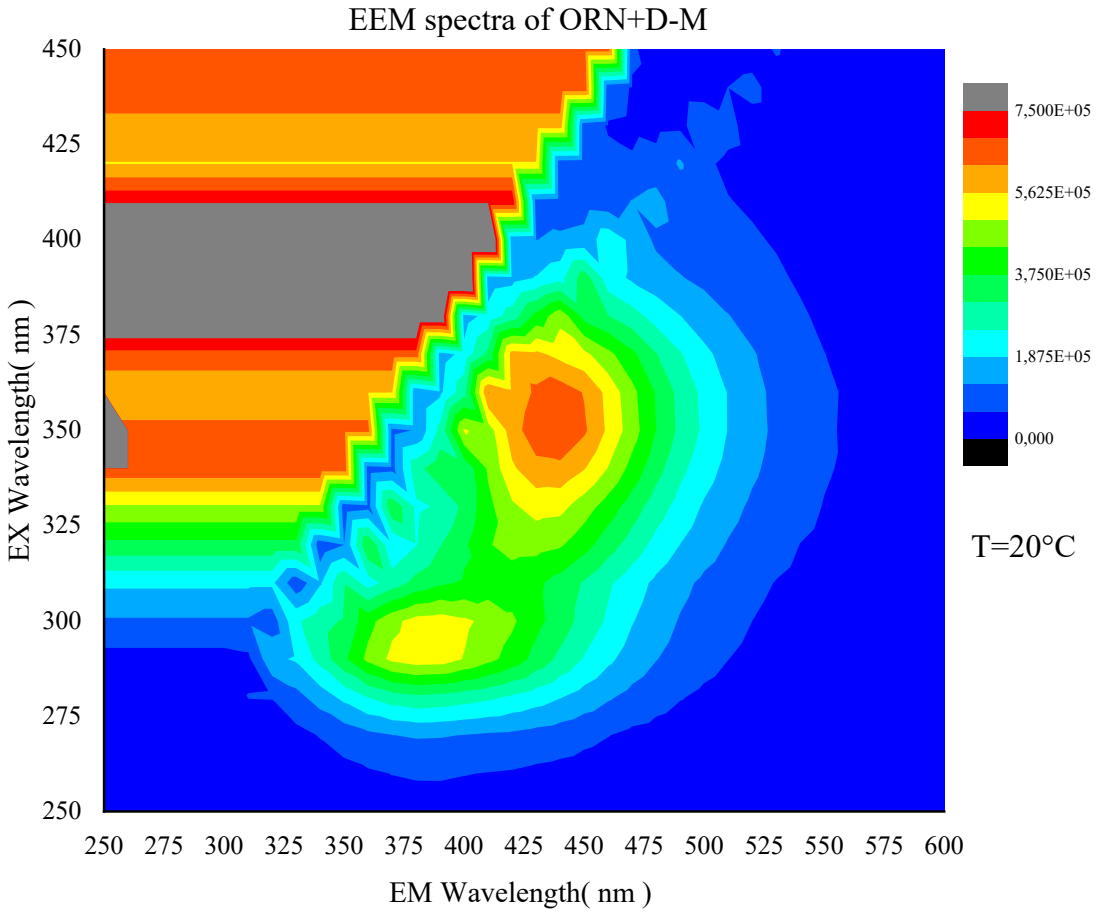
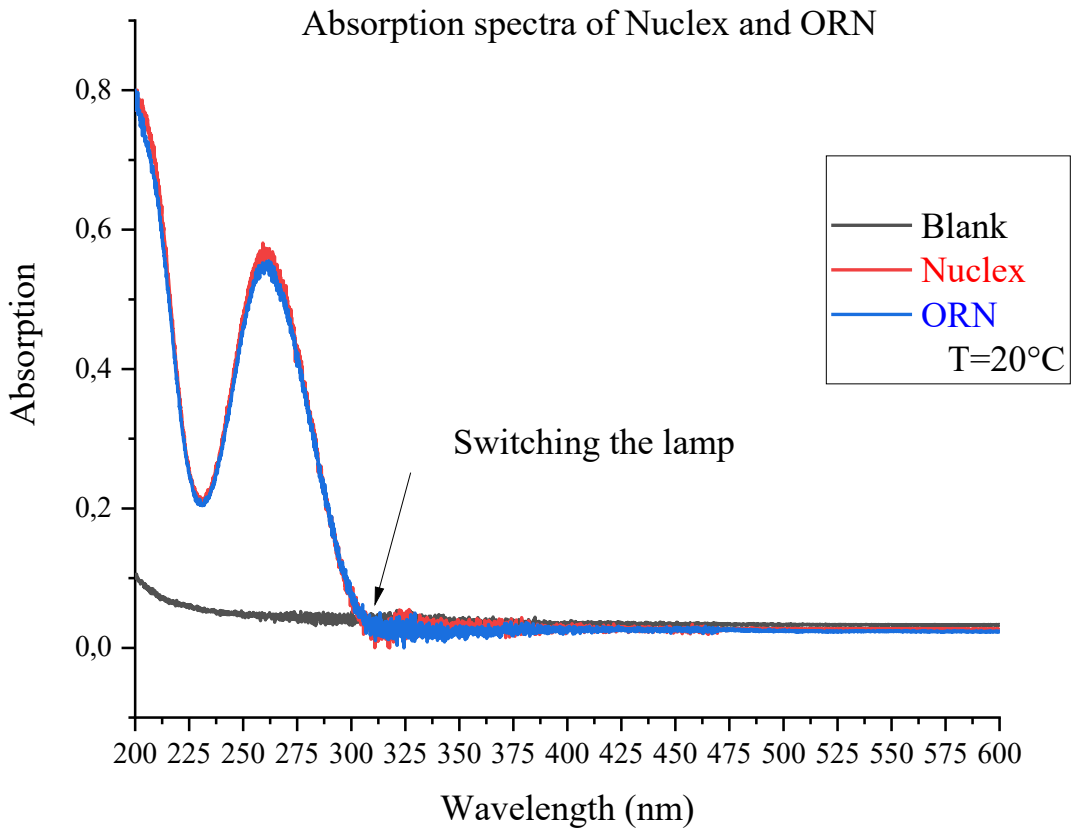
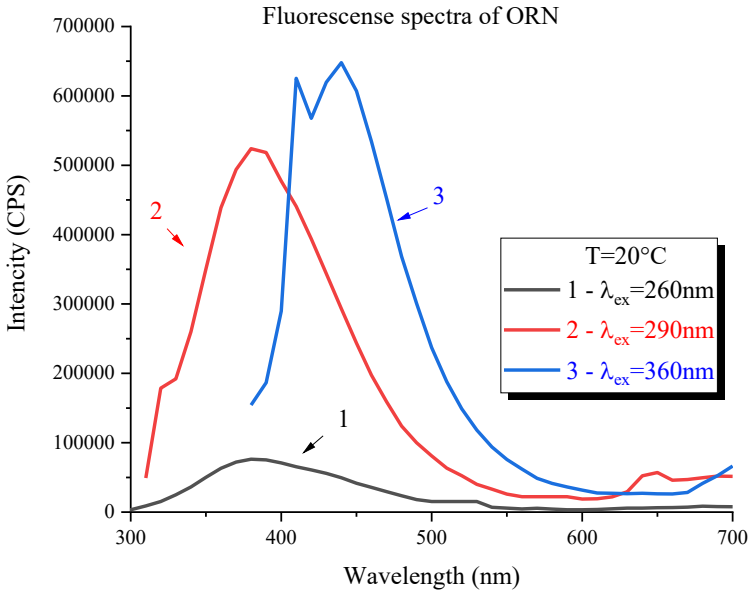



While D-M is added, the correlation between the emission peaks of 380 and 440 nm begins to changes (peak 440 weakens and 385 increases), which may indicate the complexation of ORN and D-M.

# Results and discussion




In the spectra of absorption, these sides are not revealed but have a strong emission compared to the excitation at a wavelength of 260 nm.



# Conclusions

- We found the **two fluorescence centers of Nuklex** (*with a maximum emission of 380 nm at an excitation wavelength of 290 nm (the emission of 310-550 nm) and a maximum of 440 nm, with the excitation of 360 nm (the emission of 350-610)*);
- Identified the **possibility of forming complexes between ORN and D-M** (*In the Nuklex, the excitation peak of 290 nm is significantly dominated by the intensity of the excitation peak of 360 nm, and in the ORN, the correlation between the same centers is reversed. While D-M is added, the correlation between the emission peaks of 380 and 440 nm begins to changes*).