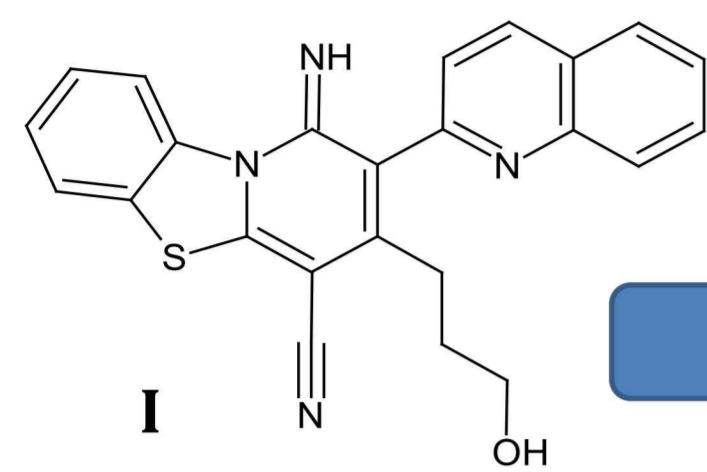




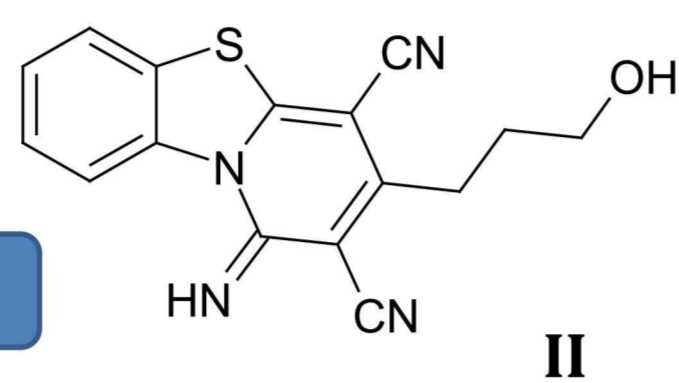
# pH SENSITIVE PROBES IMMOBILIZED IN PROTON-PERMEABLE FILMS

A. M. Makeiev, V. I. Kozenko, T. Ie. Keda  
 Taras Shevchenko National University of Kyiv  
 Kyiv, Volodymyrska, 64; e-mail: makeev\_a@ukr.net

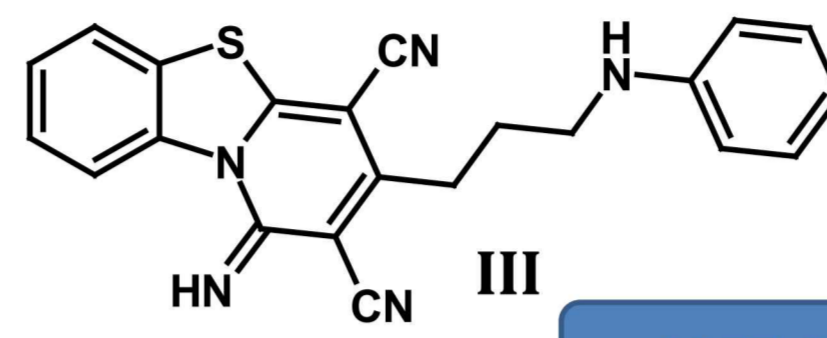
## ACIDIMETRIC "ON-OFF" AND "OFF-ON" PROBES



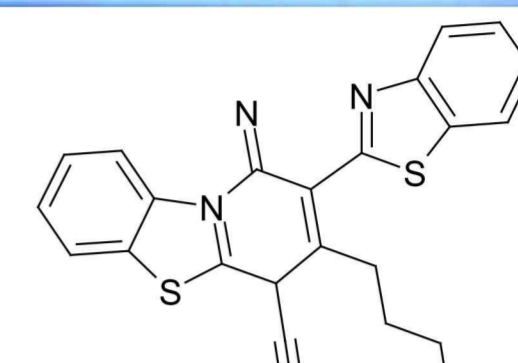
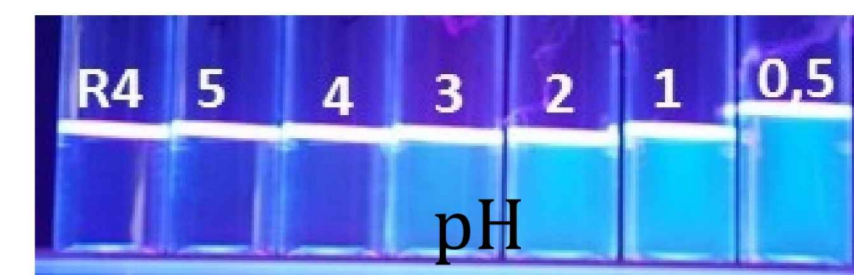
"ON-OFF" - reagents



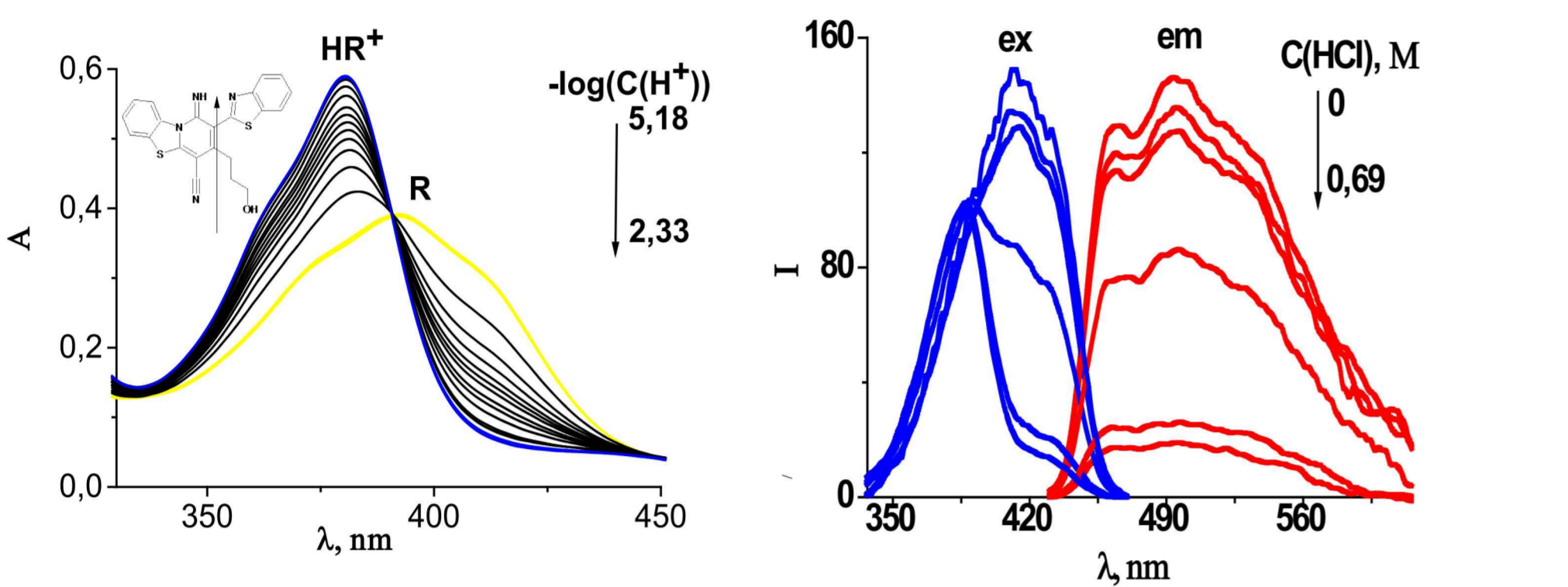
II



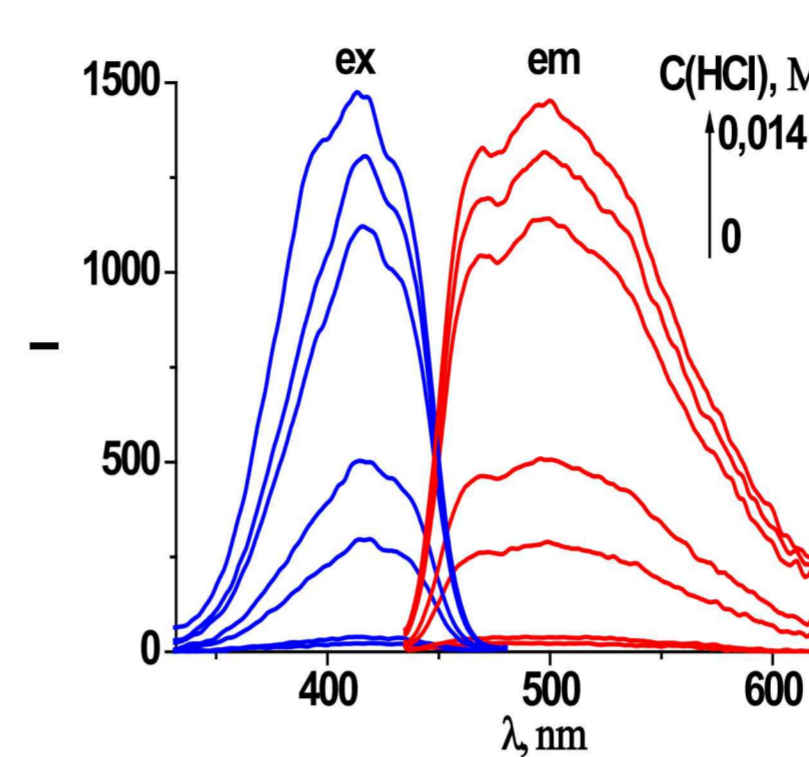
"OFF-ON" - reagents



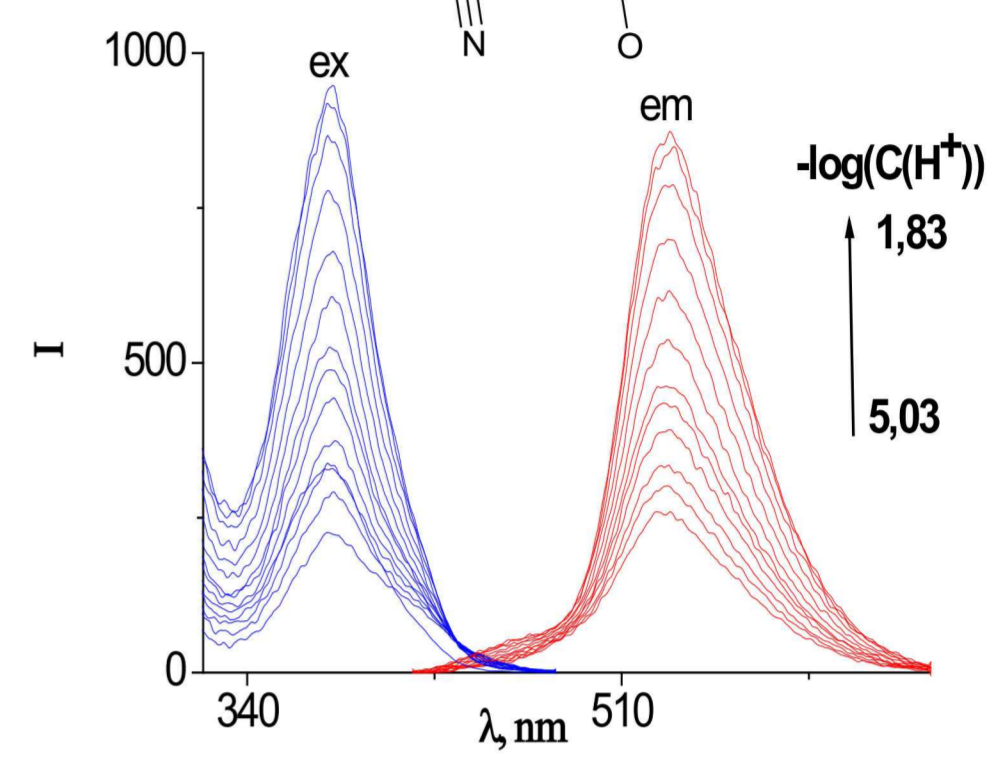
IV



1. Absorption spectra of compound I, excitation and fluorescence spectra of compound II in ethanol with HCl.  $\ell=1,00$  cm

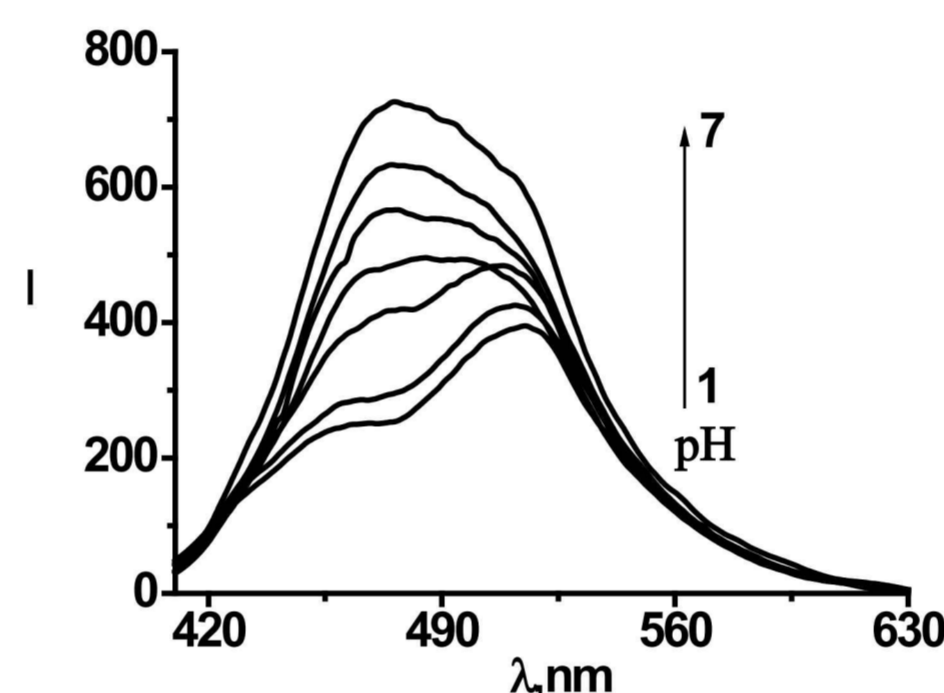
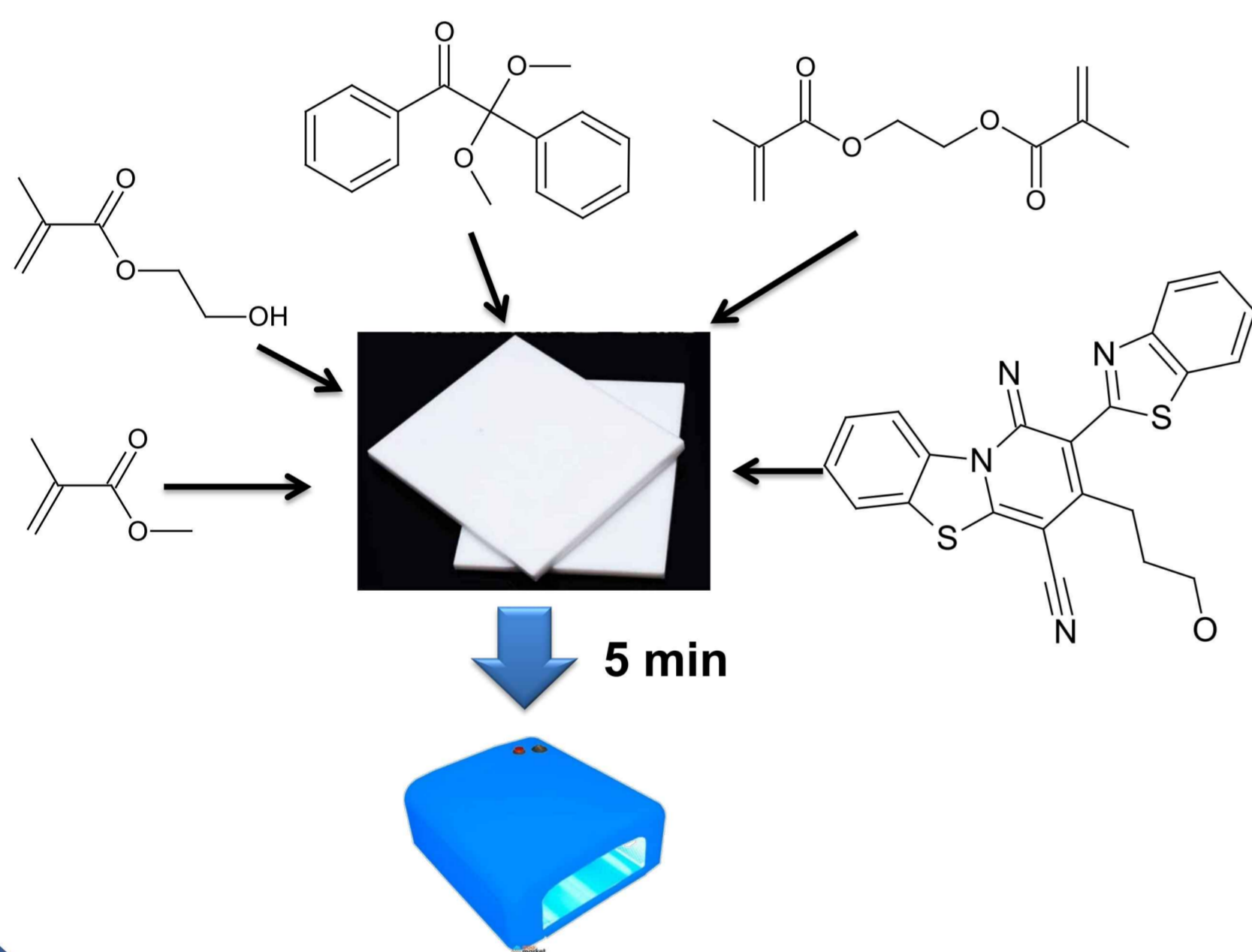


2. Fluorescence of compounds III and IV in ethanol with HCl.  $\ell=1,00$  cm

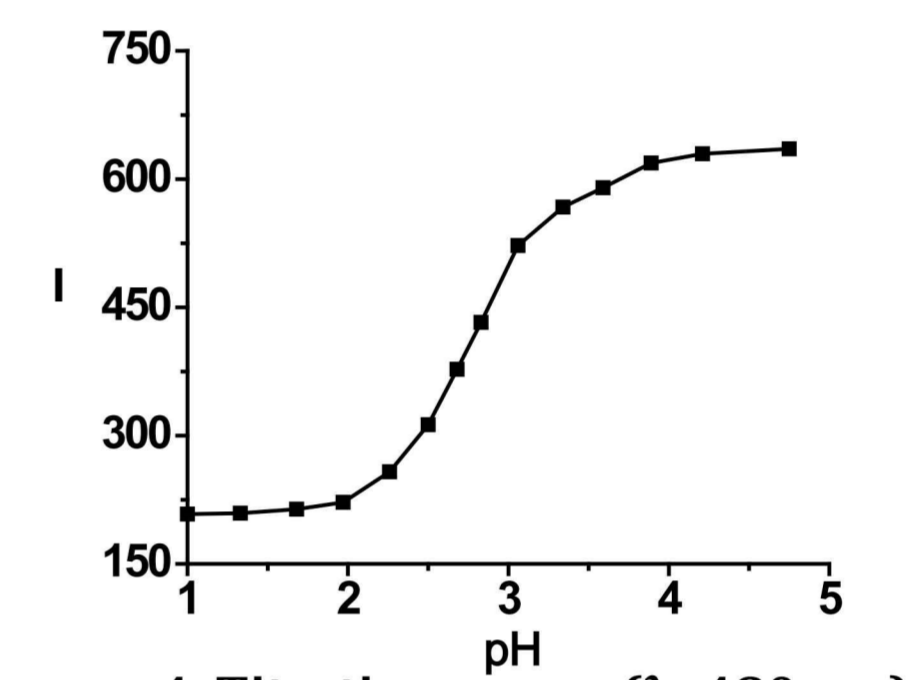


## ACIDIMETRIC PROTON-PERMEABLE FILMS

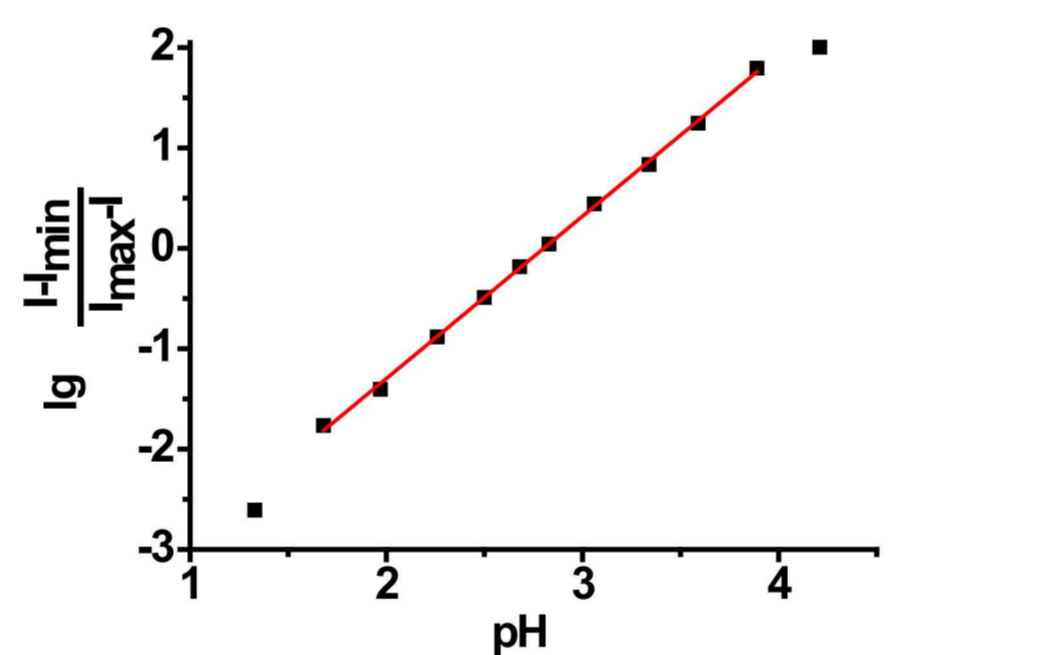
### OBTAINING MODIFIED FILMS:



3. Film fluorescence spectra depending on pH



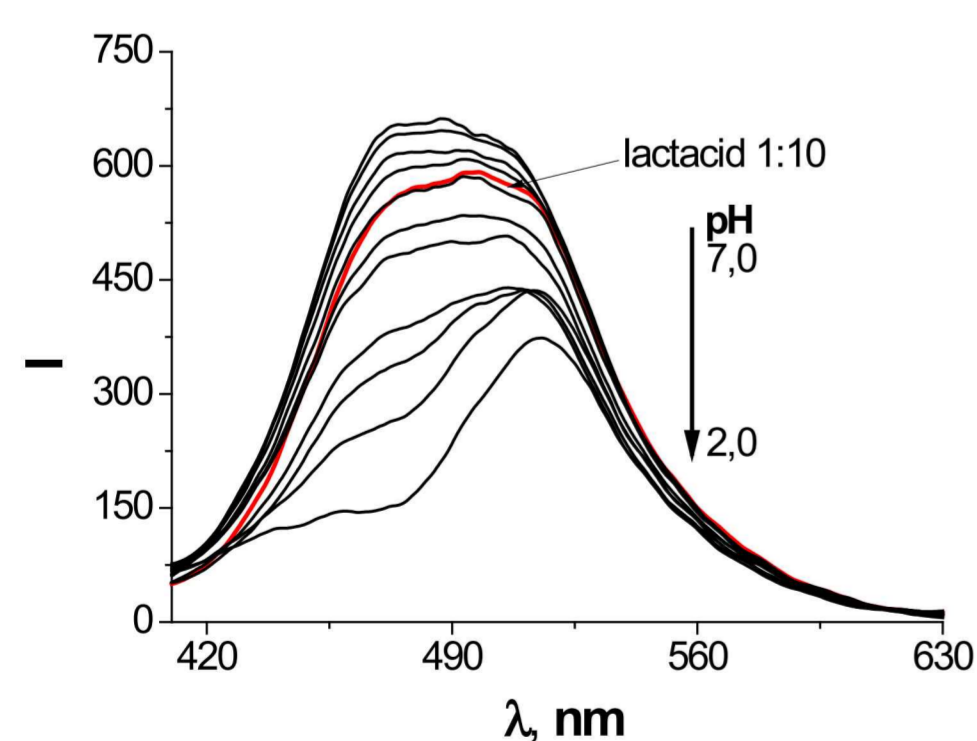
4. Titration curves ( $\lambda=480$  nm)



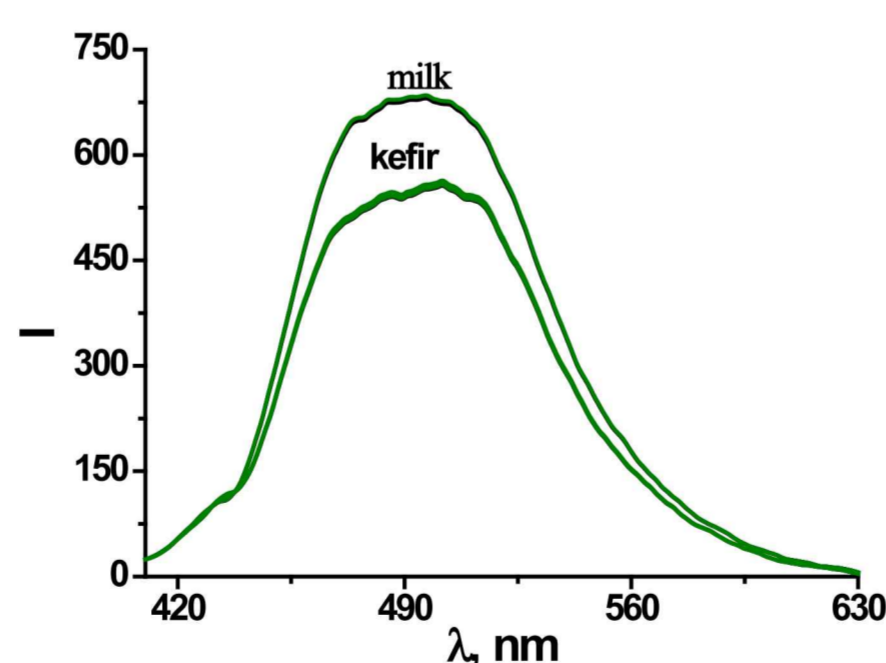
5. The titration curve in Henderson-Hasselbach coordinates

Range of linearity	1,7...3,9
Equation of a Straight Line	$\lg \frac{I-I_{\min}}{I_{\max}-I} = (-4,53 \pm 0,05) + (1,62 \pm 0,02)\text{pH}$
Correlation coefficient	0,999

## ANALYSIS OF OBJECTS



6. Fluorescence spectra of the film at different pH of the solution and lactic acid solution



7. Fluorescence spectra of the film after treatment with dairy products

Object	pH (measured)	Literature information
Milk	$6,39 \pm 0,06$	6,3 - 6,7
Kefir	$4,39 \pm 0,10$	4,2 - 4,7
Detergent	$5,0 \pm 0,1$	4,98

## CONCLUSIONS

- An increase in the acidity of the environment affects the optical and luminescent properties of 1-imino-4-cyanopyridine derivatives, which is accompanied by a hypsochromic shift in the absorption spectra of compounds, as well as quenching or an increase in the luminescence intensity of reagents in the solution, on the basis of which an acidimetric probe for gastric juice was developed.
- Based on the studied probes, pH-sensitive fluorescent films were created to determine acidity in the range of 1.7-3.9 and 4.0-6.5 pH units.
- The measured pH values with the help of a modified polymer film for lactic acid products are consistent with the norms (pH of milk (2.5%) -  $6.39 \pm 0.06$ ; pH of kefir (1%) -  $4.39 \pm 0.10$ ). The pH of the aqueous solution of lactic acid (1:10) was  $5.0 \pm 0.2$ . The obtained data are consistent for the glass electrode.

## REFERENCE

- Borysova M.O., Kyriakulov V.O., Makeiev A.M., Shemehen R.V., Keda T.Ie., Khilya O.V., Zaporozhets O.A., Volovenko Yu.M. IX INTERNATIONAL CONFERENCE IN CHEMISTRY KYIV-TOULOUSE (ICKT-9) 2017  
 Борисова М.О., Макеєв А.М., Кеда Т.Є., Хілія О.В., Запорожець О.А. XX Міжнародна конференція студентів та аспірантів «Сучасні проблеми хімії» 2019  
 Пугач І.О., Свєшніков А.С., Макеєв А.М., Мілохов Д.С., Кеда Т.Є., Хілія О.В., Запорожець О.А. International Conference for Students and PhD Students «Modern Chemistry Problems» 2018