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**PULSED LASERS AND LASER APPLICATIONS**

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**ABSTRACTS**

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*The section is devoted to the 125th anniversary of A.N. Terenin*

## Session B

### PHOTONICS OF OPTICAL MATERIALS AND OPTOELECTRONICS

B-1

#### THE DEVELOPMENT OF A.N. TERENIN CONCEPTS AT TOMSK UNIVERSITY: STAGES AND PERSONALITIES

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Photonics is a source of innovative industrial development at the present time. The report is devoted to the physical processes of energy conversion and chemical reactions that occur under the action of light radiation in molecules of complex structure. For this borderline area of research, Academician A.N. Terenin coined the term "photonics". The idea of the photonics of molecules was brought to Tomsk by N.A. Prilezhaeva, graduate student of A.N. Terenin, exiled as a "socially alien element" (she was a noblewoman) from Leningrad to Tomsk in 1935. The report contains the main electronic processes caused in molecules by the absorption of photons, leading to a temporary or persistent change in matter. The following are considered: the structure of molecules and their spectra, intramolecular energy, dependences of light absorption and luminescence, energy degradation, the effect of a solvent, the mechanism of photochemical processes in the molecules themselves or with their participation as sensitizers. The main attention is paid to the historical stages and current events in several areas of photophysics and photochemistry, which were developed at Tomsk University.

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B-2

#### DEVELOPMENT OF IR STUDIES OF SURFACES IN ST. PETERSBURG UNIVERSITY

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The history of spectral studies of surface processes in St. Petersburg University is followed. First studies of surface species by means of IR spectroscopy were carried out by Terenin and Kassparov, published in 1940, 15 years before the first paper by Eischens in USA. In 1948 in Leningrad a thesis supervised by A.N. Terenin, was defended by Yaroslavsky. After the war these works were continued by Sidorov, Karyakin, Filimonov and their followers. Further advances in the application of IR spectroscopy for the studies of surface phenomena as well as the development of experimental technique are considered. Spectroscopy at low and variable temperatures enable us to broaden the number of test molecules for surface sites and to use simple molecules that do not adsorb at 300 K, such as CO, NO, H<sub>2</sub> and CHF<sub>3</sub> to characterize surface acidic and basic sites and to estimate their concentration. The strength of surface sites is affected by lateral interactions between the adsorbed species. Unlike static interaction, dynamic one accounts for the changes in the contours particularly strong for the most intense bands. Some molecules, such as CO, reveal linkage isomerism and form with the cations in zeolites, besides the C-bonded species, the energetically unfavorable O-bonded complexes.