

## Pre-Symposium Workshop

The Centro de Nanociencias y Nanotecnología is pleased to announce a Pre-Symposium Workshop by Professor Alexey Tsyganenko. The workshop will be held one week before the IVSNN and will be free.

«Theory and practice Workshop: **Optical Spectroscopy in Surface Science**»

**Place:** Auditorium of Centro de Nanociencias y Nanotecnología

<b>Date</b>	<b>April 18</b>	<b>April 19</b>	<b>April 20</b>
<b>Time (hr)</b>	<b>10 :00 – 11 :40</b>	<b>10 :00 – 11 :40</b>	<b>11 :00 – 12 :40</b>

**Presenter:** Professor A. Tsyganenko, University of San Petersburg

**Duration:** 5 hours

**Contents:**

1. Introduction to optical spectroscopy
2. Technique of spectral studies of surfaces
3. Application of the vibrational spectroscopy to surface science
4. Surface OH groups of oxide adsorbents
5. Active sites of oxide surfaces
6. Lateral interaction between adsorbed molecules
7. Linkage isomerism on adsorption

## **Professor Alexey Tsyganenko** **University of San Petersburg**

TSYGANENKO Alexey Alexeevitch, in 1965 entered, and in 1971 graduated from the Physics Faculty of the St. Petersburg (former Leningrad) State University. Since then he works at the University. For about 10 years he worked as an assistant professor, giving lectures on molecular spectroscopy, adsorption and catalysis. Ph.D. degree received in 1975, and in 2000 the degree of Doctor of Science. Since 1987, he is a "senior research fellow", since 2002 – a professor.

In 1983 he became the head of the research group of Infrared Spectroscopy in the Department of Photonics of the Institute of Physical Research of the University. He was the supervisor of 7 Ph.D. works defended in Russia and two more defended in France.

He speaks Russian, English, French and some German. As international scientific experience, the participation in international conferences can be mentioned: *Bulgaria*, 1976; *Poland*, 1990; *Germany*, 1990, 2003; *USA*, 1990, 1996, 2011; *Finland*, 2007; *France*, 1988, 1993, 2004; *Italy*, 1993, 2006; *Great Britain*, 1993; *Spain*, 2000, 2003; *Japan*, 2012, 2013; *Mexico*, 2013, 2014, 2017; *China*, 2015; *Brazil*, 2016; plenty in the former USSR, as well as invited lectures, in English or French, in the universities and scientific centers of *France* (Caen, Paris, Lille), *Poland* (Poznan, Crakow), *Germany* (Berlin, Hannover, Hamburg), *Italy* (Turin), *Great Britain* (Norwich), *the Netherlands* (Delft, Leiden, Twente), *USA* (New York, Cleveland, Berkeley, Pittsburgh, Madison, Anaheim, Philadelphia), *Finland* (Helsinki).

In 2006 and 2016 he was a chair of the Organizing Committee of International Symposium of Molecular Photonics (St. Petersburg, 2006 and 2016).

In 1987- 1988 he worked at the University of Caen (France) for 8 months, as an invited investigator, in 1992-1993 he worked at the same university for 10 months as an associated professor, and in 1995-97 for three months each year, and in 1999-2000 and 2001-2002 twice for six months as an invited professor.

In 1991 and 1996 he worked for 3 and 4 weeks, respectively, in the University of Hamburg (Germany). In 1994, one month in Delft University of Technology (The Netherlands), in 1998, 2000 and 2002 for 1- 4 weeks in the University of the Balear Islands, Palma (Spain), in 2009 and 2011 twice 1 week in Helsinki University, Finland.

The whole list of publications includes more than 120 works in scientific journals and about 150 papers presented at national and international conferences and congresses.

### **Selected list of the most important publications**

1. A.A. TSYGANENKO, V.N. FILIMONOV. Infrared spectra of surface hydroxyl groups and crystalline structure of oxides. *J. Molecular Structure*, 19, 579, 1973.
2. A.A. TSYGANENKO, D.V. POZDNYAKOV, V.N. FILIMONOV. Infrared study of surface species, arising from ammonia adsorption on oxide surfaces. *J. Molecular Structure*, 29, 299, 1975.

3. E.P. SMIRNOV, A.A. TSYGANENKO. CNDO study of the properties of the OH groups. *Reaction Kinetics Catal. Lett.* 7, 425, 1977.
4. A.A. TSYGANENKO, V.N. FILIMONOV. IR spectroscopic evidence for the surface complexes of singlet oxygen. *Spectroscopy Letters*, 13, 583, 1980.
5. A.A. TSYGANENKO, L.A. DENISENKO, S.M. ZVEREV, V.N. FILIMONOV. Infrared study of lateral interactions between carbon monoxide molecules adsorbed on oxide catalysts. *J. Catalysis*, 94, 10, 1985.
6. A.A. TSYGANENKO, S.M. ZVEREV. Mechanism of lateral interactions between molecules adsorbed on oxide surfaces. *Reaction Kinetics Catal. Lett.* 36, 269, 1988.
7. S.M. ZVEREV, K.S. SMIRNOV, A.A. TSYGANENKO. Infrared study of low-temperature adsorption of molecular nitrogen on oxide surfaces. *Kinetics and Catalysis*, 29, No 6, 1251-1257, 1988.
8. A.A. TSYGANENKO, J. LAMOTTE, J.P. GALLAS, J.C. LAVALLEY. Infrared study of low-temperature CO adsorption on  $\text{La}_2\text{O}_3$ . *J. Phys. Chem.* 93, 4179, 1989.
9. M.A. BABAEVA, D.S. BYSTROV, A.YU. KOVALGIN, A.A. TSYGANENKO. CO interaction with the surface of thermally activated CaO and MgO. *J. Catalysis*, 123, 396-416, 1990.
10. A.A. TSYGANENKO, K.S. SMIRNOV, A.M. RZHEVSKIJ, P.P. MARDILOVICH. Infrared spectroscopic evidence for the structural OH groups of spinel alumina modifications. *J. Materials Chem. and Physics*, 26, No.1, 35-46, 1990.
11. K.M. BULANIN, J.C. LAVALLEY, A.A. TSYGANENKO. IR study of ozone adsorption on  $\text{TiO}_2$  (Anatase). *J. Phys. Chem.* 99, 10294-10298, 1995.
12. A.A. TSYGANENKO, V.A. ERMOSHIN, M.R. KEYSER, K.S. SMIRNOV. Spectral manifestations of the dynamic interactions between adsorbed molecules. A computer modelling study. *Vibr. Spectroscopy*. 13 (1996) p.11-22.
13. A.A. TSYGANENKO, P.P. MARDILOVICH. Structure of alumina surfaces. *Faraday Transactions*. 92 (1996) p.4843-4852.
14. O.V. MANOILOVA, J.C. LAVALLEY, N.M. TSYGANENKO, A.A. TSYGANENKO. Low temperature IR study of ozone interaction with ethylene adsorbed on silica. *Langmuir*, 1998, vol. 14, N 20, 5813-5820.
15. C. OTERO AREAN, A.A. TSYGANENKO, E. ESCALONA PLATERO, E. GARRONE, A. ZECCHINA. Two coordination modes of CO in zeolites: A temperature-dependent equilibrium. *Angew. Chemie. Intern. Ed.*, 1998, vol. 37, N 22, 3161-3163.
16. A.A. Tsyganenko, E.N. Storozheva, O.V. Manoilova, T. Lesage, M. Daturi, J.-C. Lavalley. Bronsted acidity of silica silanol groups induced by adsorption of acids. *Catalysis Letters*. 2000, 70, No 3-4, 159-163.
17. C. Otero Areán, G. Turnes Palomino, A.A. Tsyganenko, E. Garrone. Quantum chemical and FTIR spectroscopic studies on the linkage isomerism of carbon monoxide in alkali-metal-exchanged zeolites: A Review of current research. *International Journal of Molecular Sciences*, 3 (2002) 764-776.
18. P.Yu. STOROZHEV, C. OTERO AREÁN, E. GARRONE, P. UGLIENGO, V.A. ERMOSHIN, A.A. TSYGANENKO. FTIR spectroscopic and *ab initio* evidence for the amphipathic character of CO bonding with silanol groups. *Chem. Phys. Lett.* v. 374 (2003) N 5-6, p.439-445.
19. P.YU. STOROZHEV, V.S. YANKO, A.A. TSYGANENKO, G. Turnes Palomino, M. Rodriguez Delgado, C. Otero Areán. Isomeric states of polar molecules on ionic



surfaces: electrostatic model and FTIR studies. *Applied Surface Science* 238 (2004) 390-394.

20. A.A. TSYGANENKO, E.V. KONDRATIEVA, V.S. YANKO, P.YU. STOROZHEV. FTIR study of CO adsorption on basic zeolites. *J. Mater. Chem.*, 2006, vol. 16, 2358-2363.
21. E.V. KONDRATIEVA, O.V. MANOILOVA, A.A. TSYGANENKO. Integrated extinction coefficient of adsorbed CO. *Kinetics and Catalysis* 2008, v. 49, No. 3, p. 451-456.
22. A.A. Tsyganenko. Linkage isomerism of adsorbed molecules. *High Energy Chemistry*, 2008, Vol. 42, No. 7, pp. 610–613.
23. A.V. RUDAKOVA, V.N. SEKUSHIN, I.L. MARINOV, A.A. TSYGANENKO. The preparation and IR spectroscopic testing of surface of pure water ice and icy mixtures with prussic acid and ammonia. *Langmuir*, 2009, v. 25, №3, pp 1482–1487.
24. A.A. TSYGANENKO, A.M. CHIZHIK, A.I. CHIZHIK. A FTIR search for linkage isomerism of CN-ions on oxides and zeolites. *Phys. Chem. Chem. Phys.*, 2010, 12, N24, 6387 - 6395.
25. A.A. TSYGANENKO. Low temperature infrared spectroscopy of surface species. In: “Physics and Chemistry at Low Temperatures” L. Khriachtchev ed., World Scientific (Pan Stanford Publishing Pte.). 2011, P. 267-296.
26. A.V. RUDAKOVA, M.S. PORETSKIY, I.L. MARINOV, A.A. TSYGANENKO. IR Spectroscopic Study of Surface Properties of Amorphous Water Ice. *Optics and Spectroscopy*, 2010, Vol. 109, No. 5, pp. 708–718.
27. A.A. TSYGANENKO, N.V. ZAKHAROV, P.D. MURZIN,  $\text{CHF}_3$  as a probe for surface basicity, *Catal. Today* 2014, VOL. 226, p. 73–80.
28. R. BELYKH, M. MAEVSKAYA, I. KRAUKLIS, A. TSYGANENKO. Linkage isomerism of CO adsorbed on alkali halides. *J. Phys. Chem. A* 2015, v. 119, No.11, pp. 2363-2370.
29. A. DOBROTVORSKAIA, T. KOLOMIITSOVA, S. PETROV, D. SHCHEPKIN, A. TSYGANENKO. Effect of resonance dipole-dipole interaction on spectra of adsorbed  $\text{SF}_6$  molecules. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*. 2015, v. 148, pp. 271–279.
30. A.N. DOBROTVORSKAIA, O.S. PESTSOV, A.A. TSYGANENKO. Lateral interaction between molecules adsorbed on the surfaces of non-metals. *Topics in Catalysis*. 2017. Top Catal DOI 10.1007/s11244-017-0835-8.