Curriculum Vitae
by Oleg A. Tikhomirov, PhD

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Personal	Born December 5, 1961 in Khabarovsk, Russia (USSR) Divorced, one daughter (16)	
Education & research career	1979-1985	Moscow Institute of Physics & Technology, Department of General and Applied Physics
	1985-1987	Post-graduate student, Institute of Solid State Physics (ISSP), Russian Academy of Sciences, Chernogolovka, Moscow district, Russia
	1988-1991	Junior scientist, ISSP
	1991	PhD at the Institute of Solid State Physics (ISSP) Thesis: Nonlinear dynamics of magnetization in the ac magnetic field and domain structure transformations in the field of ultrasound
:	1992-2003	Research Scientist, ISSP
	2004-current	Senior Research Scientist, ISSP
International work	Jan-Jun 1998	Guest Scientist, Laboratory of Optical Materials with Specific Properties, Lorrain Center of Optics and Electronics of Solids, Supelec, Metz, France
	1998-2001	Research Associate, University of Pittsburgh, Pittsburgh, PA, USA
	Apr-May 2003	INFM and University of Pisa, Pisa, Italy
	Oct-Dec 2003	University of Saarland, Saarbrücken, Germany
	2004-2006	Marie Curie Incoming International Fellow, INFM and University of Pisa, Pisa, Italy
Membership	American Physical Society (1998-2002) Material Research Society (2000-2001)	

Main interests	1. Domain structure and local phase transitions in ordered media (ferroelectrics, ferromagnets, ferroelastics) - spatially resolved studies using various kinds of scanning probe microscopy and modified optical microscopy. 2. Domain wall dynamics - direct experimental study using optical and electronic techniques.
Other interests	Scanning probe microscopy Ferroelectric thin films Relaxors Ferromagnetism

Research background

General trend of my research consists in development and optimization of optical and/or scanning probe microscopy to fit these techniques to investigations of ordered materials, mainly, ferroelectrics and ferromagnets. I started from investigations of dynamical behavior of individual domain walls and their ensembles in ferrimagnetic yttrium iron garnet single crystals excited by ac magnetic field or ultrasound. Magnetooptic observations using the Faraday and Cotton-Mouton effects were combined with inductive measurements of electromagnetically induced signal in a secondary coil. These experiments fulfilled in frames of general direction of studies in ISSP were followed by direct experimental study of domain wall dynamics in ferroelectric-ferroelastic gadolinium molybdate single crystals using the birefringence effect. Results on domain structure kinetics helped to understand the origin and features of the light deflection effect studied in Supelec (Metz). Spreading of observations to other kinds of ferroelectric materials faced lack of the birefringence contrast between antiparallel domains for many important experimental configurations; to overcome this obstacle an original dark field technique was developed to observe domains in lithium niobate single crystals. These ideas combined with scanning technologies developed in Pittsburgh resulted in creation of a new experimental technique – scanning electrooptic microscopy. Local measurements of linear electrooptic effect (odd in electric field) allow one to observe antiparallel domains in different classes of ferroelectric crystals and thin films. Among other results, the assumed local ferroelectric regions were visualized for the first time in strontium titanate thin films. The second setup of this kind was built in Pisa where investigations were extended to other ferroelectric materials (ceramics and relaxors). Factors affecting performance of electrooptic microscopes in confocal and near-field configurations were also studied. Currently in ISSP I carry out investigations on magnetic exchange bias systems using the magnetooptic indicator film technique working by the double Faraday effect. Among other fulfilled tasks I can mention an experimental setup built in Saarbrücken for observation of stream lines in liquid polymers using small fluorescent tracking particles.

Publications: 24 original articles (the list is attached)

List of publications

1. V.K.Vlasko-Vlasov, V.I. Nikitenko, **O.A. Tikhomirov**, and L.S. Uspenskaya. On the possibility of operation with the 180 degree domain wall lattice using ac fields. *IEEE Trans. Magn.* **23**, 168-170 (1987).

2. V.K. Vlasko-Vlasov, V.I. Nikitenko, and **O.A. Tikhomirov**. Forced oscillations of Bloch lines and nonlinear transformations of the domain wall structure in the ultrasound wave field. *J. Magn. Magn. Mater*. **75**, 383-385 (1988).

3. V.K. Vlasko-Vlasov and **O.A. Tikhomirov**. Direct experimental investigation of the interaction of ultrasound with Bloch lines and domain walls. *Sov. Phys. Solid State* **32**, 978-985 (1990).

4. V.K. Vlasko-Vlasov and **O.A. Tikhomirov**. Coercivity of domain walls in the magnetic ac field. *Sov. Phys. Solid State* **33**, 1960-1963 (1991).

5. V.K. Vlasko-Vlasov and **O.A. Tikhomirov**. Vibrations of unipolar domain walls in the field of an ultrasonic wave. *Sov. Phys. Solid State* **33**, 1964-1966 (1991).

6. **O.A. Tikhomirov**. Domain wall oscillations near the coercivity threshold. *Sov. Phys. Solid State* **36**, 1069-1074 (1994).

7. **O.A. Tikhomirov** and B.S. Red'kin. Direct optical investigation of the domain wall oscillations in ac field. *Ferroelectrics* **189**, 73-80 (1996).

8. **O.A. Tikhomirov**. Anomalies of ferroelectric domain wall motion near the transition point. *J. Appl. Phys*. **80**, 2358-2362 (1996).

9. **O.A. Tikhomirov**. Vibrations of domain walls in ac field and the low frequency permittivity of ferroelectrics. *Ferroelectrics* **190**, 37-42 (1997).

10. **O.A. Tikhomirov**. The motion of a domain wall under the elastic field. *Ferroelectrics* **233**, 139-144 (1999).

11. **O.Tikhomirov** and B. Red'kin. Optical observation of the antiparallel domain structures. *Ferroelectrics* **222**, 339-343 (1999).

12. **O. Tikhomirov**, B. Red'kin, A. Trivelli, and J. Levy. Visualization of 180 degree domain structures in uniaxial ferroelectrics using confocal scanning optical microscopy. *J. Appl. Phys*. **87**, 1932-1936 (2000).

13. **O. Tikhomirov** and J. Levy. Confocal microscopy of electrooptic materials: effect of aberrations on the axial response in ac mode. *J. Opt. Soc. Am. A* **17**, 1214-1220 (2000).

14. **O. Tikhomirov**, H. Jiang, and J. Levy. Direct observation of local ferroelectric phase transitions in $Ba_xSr_{1-x}TiO_3$ thin films. *Appl. Phys. Lett*. **77**, 2048-2050 (2000).

15. **O. Tikhomirov**, H. Jiang, and J. Levy. Local ferroelectricity in $SrTiO_3$ thin films. *Phys. Rev. Lett*. **89**, 147601 (2002).

16. **O. Tikhomirov** and J. Levy. Study of the ferroelectric domain structure and phase transitions by confocal scanning optical microscopy. *Ferroelectrics* **292**, 161-169 (2003).

17. J. Levy and **O. Tikhomirov**. Nanoscale Optical Probes of Ferroelectrics. In: M. Alexe and A. Gruverman (Editors), *Nanoscale characterization of ferroelectric materials*. Springer-Verlag, Berlin Heidelberg New York, pp. 115-142 (2003).

18. V.S. Gornakov, Yu.P. Kabanov, V.I. Nikitenko, **O.A. Tikhomirov**, A.I. Shapiro, and R.D. Shull. Chirality of a forming spin spring and remagnetization features of a bilayer ferromagnetic system. *J. Exp. Theor. Phys*. **99,** 602-612 (2004).

19. V.S. Gornakov, Yu.P. Kabanov, V.I. Nikitenko, and **O.A. Tikhomirov**. Rotational hysteresis and chirality of the spin spiral structure in exchange coupled heterostructures. *Phys. Met. Metallogr*. **101**, Suppl.1, S37-S40 (2006).

20. **O. Tikhomirov**, M. Labardi, and M. Allegrini. Scanning probe microscopy applied to ferroelectric materials. In: B.Bhushan and H. Fuchs (Editors), *Applied Scanning Probe Methods III: Characterization.* Springer Verlag, Berlin Heidelberg New York, pp. 217-259 (2006).

21. **O. Tikhomirov**, M. Labardi, C.Ascoli, M. Allegrini, and L. Lebrun. Imaging of ferroelectric polarization in $Pb(Mg_{1/3}Nb_{2/3})O_3$-$PbTiO_3$ crystals by scanning electro-optic

microscopy. *Appl. Phys. Lett*. **88**, 152910 (2006).

22. **O. Tikhomirov**, M. Labardi, C.Ascoli, M. Allegrini, and C. Galassi. Bilateral switching of the modulated electrooptic contrast in PLTZN ceramics. *Solid State Comm*. **138**, 60-63 (2006).

23. **O. Tikhomirov**, M. Labardi, C. Ascoli, and M. Allegrini. Scanning electrooptic microscopy of the relaxor materials. *Ferroelectrics* **341**, 21-28 (2006).

24. V.S. Gornakov, Yu.P. Kabanov, **O.A. Tikhomirov**, V.I.. Nikitenko, S.V. Urazhdin, F.Y. Yang, C.L. Chien, A.J. Shapiro, and R.D. Shull. Experimental study of the microscopic mechanisms of magnetization reversal in FeNi/FeMn exchange-biased ferromagnet/antiferromagnet polycrystalline bilayers using the magneto-optical indicator film technique. *Phys. Rev. B* **73**, 184428 (2006).

Papers in preparation

25. M. Labardi, **O. Tikhomirov**, C. Ascoli, and M. Allegrini. Balanced homodyning for apertureless near-field optical imaging. Submitted to *Rev. Sci. Instrum*.

26. **O. Tikhomirov**, M. Labardi, C. Ascoli, and M. Allegrini. Near-field electrooptic imaging of ferroelectric domains. In preparation.

27. Yu.P. Kabanov, V.I. Nikitenko, **O.A. Tikhomirov**, W.F. Egelhoff, A.J. Shapiro, and R.D. Shull. Asymmetric magnetization reversal of the patterned ferromagnetic/antiferromagnetic film. In preparation.