
Prof. DSc. Nikolay Leonyuk
Moscow State University, Russia

General information

Name: Nikolay I. LEONYUK

Born: on November 21, 1941 in Brest Distr., Republic Belarus (former USSR)

Office: Professor of Moscow State University, Geological Faculty, Moscow, Russia

Fields of Research

Research primarily concerns crystal growth, crystallography, crystal chemistry, crystal physics of minerals and synthetic materials. Since the seventies, the main attention was paid to anhydrous borates, and several important new physical effects have been discovered from studying of these crystals. It became possible to grow borate single crystals with sufficiency large sizes and high homogeneities and to consider some of the grown crystals as multifunctional materials for modern applications: laser and non-linear optical crystals with high efficiency, new laser media with double function and tunability, piezoelectrics and acousto-electrics, etc. Current major interests include the crystal growth and structure-property relationships in the borate systems and, also, other compounds: borosilicates, silicates, phosphates (berlinite), cuprates (high-T_c superconductors), tantalates, oxides like corundum (ruby), alexandrite, calcite, quartz, diamond. A correlation between the growth conditions, composition, structure and properties of these crystals is currently studying. Also, crystallochemical approach is developed to optimize crystal growth conditions in complex systems and to search for new minerals and their artificial analogues for science and modern applications.

Publications: total - over 700, books - 7, patents - 10.

Teaching: (1) Two long-term courses of lectures on the crystal growth for students-crystallographers of the 3rd, 4th, 5th and 6th academic years at the MSU – “CRYSTAL GROWTH: Theory & Methods”(bachelor students), CRYSTAL GROWTH: Low-dimensional crystalline materials” (Master students); (2) Course of lectures and laboratory works "Crystal Growth of Gem Stones" for students-gemmologists of the MSU.

Honours and Memberships

Fellowships: 1995 - International Studies & Programs, University of Wisconsin-Madison, USA; 1997 - NATO-CNR, University of Parma, Italy; 1998/1999 - Cariplo Foundation, University of Milan, Italy; 1999 - Ministry of Education of P.R.China, Shandong University, 2004 - Visiting Research Scholar Award Macquarie University Research Development Grant Scheme Round 2, Sydney, Australia; 2004China; 2004/2005 and 2009/2010 - Cariplo Foundation, Politecnico di Milano, Italy.

Honours and Memberships: Member of the IUCr, since 1976; Member of the Russian Mineralogical Society, since 1978; Soros Professor, 1997, 1998, 1999; Medal “850 Years of Moscow Foundation”, 1997; Laureate of Competition in the field of natural science “Grant of Moscow”, 2001, 2002, 2004, 2005.

Education and Qualifications

1969: Graduated from Moscow State University (MSU)

1969-1972: Postgraduate (MSU)

1972: Ph.D. degree in Crystallography and Crystal Physics (MSU)

1985: Doctor of Science degree in Inorganic Chemistry (MSU)

Professional experience

Present post: Professor and Head of laboratory, MSU (*since 1988*)

1972 - 1985: Senior Scientist (MSU)

1985 - 1988: Principal Scientist and Head of laboratory (MSU)

1988 - present: Professor and Head of laboratory (MSU)

Research work

Research projects since 2000: 1998-2000 – “Development of new non-linear optical solids: from the IR to the UV”, INTAS grant # 97-0515, Brussels; 1998-2000 – “Electron lattice interaction in high-temperature superconductors of the BaBiO₃ family”, INTAS grant # 97-1371, Brussels; 2000-2001 – “Development of new substrate materials for epitaxial growth of nitrides”, CLG NATO, USA; 2001 – “Development of technological basis for synthesis of minerals”, Russian Program “Integration”, grant # 211/3.2, Moscow; 2000-2002 - “Structural features of phase formation in rare earth borate and silicate polycomponent melts”, Russian Foundation for Basic Research (RFBR), grant # 00-05-65350; 2004-2006 – “Crystallogenes in anhydrous borate systems”, RFBR, grant # 04-05-64709; 2005 – “Growth, comparative crystal chemistry and physical properties of cobalt doped LaMg-aluminate and YCa-oxoborate crystals”, RFBR&NSFC (National Scientific Foundation of China), RFBR grant # 04-05-39001; 2005-2007 – “Development of improved ZnO-based substrates for epitaxial growth of GaN thin films”, Arlington, USA, CRDF award # RUC2-2627-MO-04; 2005 - "Multifunctional single crystal materials based on rare earth elements", MSU Foundation, grant MNP # 15_2005; 2005 - Visiting Research Scholar Award of Macquarie University, Research Development Grant Scheme Round 2 2004, Sydney, Australia; 2005-2006 - "Creation of physico-chemical principles relating to growth technology of Yb:YAl₃(BO₃)₄ single crystals for miniature diode-pumped self-frequency-doubled components", RFBR, grant # 05-05-08021_ofi-a; 2006-2007 – “Crystallogenes of potassium rare earth tungstates: phase formation, crystal chemistry and crystal morphology”, RFBR&NSFC, RFBR grant # 05-05-39003; 2007-2009 – “Crystallogenes of rare earth borates: From functional synthetic materials to natural prototypes”, RFBR grant # 07-05-00680-a; 2008-2009 –

“Definition of stability fields of neodymium aluminium borate structural modifications, crystal growth and creation of highly efficient micro-chip laser on their base”, RFBR grant # 08-026-12038_ofi-a; 2008-2009 – “Crystallo-chemical and physico-chemical preconditions for synthesis of (Er,Yb):YAl₃(BO₃)₄ single crystals and films for integrated optics of new generation”, RFBR&BRFBR (Belarus), RFBR grant # 08-025-90010_bel-a; 2012-2014 - “Micro-dimensional minerals of rare earth borates as prototypes of synthetic single crystals”, RFBR grant # 12-05-00912-a; 2012-2013 - “Synthesis, crystallochemical peculiarities, spectroscopic and laser properties of GdAl₃(BO₃)₄ crystals doped with Yb³⁺ and Er³⁺ ions”, RFBR&BRFBR, RFBR grant # 12-05-90010_bel-a; 2013-2014 – “Synthesis and investigation of high energy excitation relaxation and interaction of luminescence centers in rare earth borate crystals”, RFBR&UKR, RFBR grant # 13-05-90450_ukr-a; 2014-2015 -

“Crystallization, crystal-chemical features and laser properties of solid solution of (Er,Yb,Lu)Al₃(BO₃)₄”, RFBR&BRFBR, RFBR grant # 14-05-90000_bel-a.

Selected publications 2000-2018

Books:

1. N.I. Leonyuk, V.V. Maltsev. Single crystals of high-temperature borates. Moscow: «GEOS», 2017, 446p. (in Russian).
2. N.I. Leonyuk, V.V. Maltsev. Crystallogenesi in multicomponent systems. Moscow: «GEOS», 2014, 391p. (in Russian).
3. N.I. Leonyuk, E.V. Koporulina, E.A. Volkova, V.V. Maltsev. Crystallography: nucleation, growth and morphology of crystals. Moscow: 2017, M: «URAIT», 154p. (in Russian).
4. N.I. Leonyuk, E.V. Koporulina, E.A. Volkova, V.V. Maltsev. Crystal growth: Fundamentals and laboratory works. Moscow: «ГЕОС», 2014, 142 p. (in Russian).
5. N.I. Leonyuk, E.V. Koporulina, E.A. Volkova, V.V. Maltsev. Nucleation, growth and morphology of crystals. Moscow: “Max-Press”, 2010, 140 p. (in Russian).
6. N.I. Leonyuk, V.I. Lyutin, V.V. Maltsev. Crystal growth and modeling of mineral formation. Moscow: “MSU Press”, 2005, 103 p. (in Russian).

Papers:

1. A.S. Rudenkov, V.E. Kisel, K.N. Gorbachenya, A.S. Yasukevich, V.V. Maltsev, N.I. Leonyuk, N.N. Rubtsova, B.R. Semyagin, A.A. Kovalyov, V.V. Preobrazhenskii, N.V. Kuleshov. Optical Materials, 2019, Vol.89(2), pp. 261-267.
2. K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, R.V. Deineka, T. Lipinskas, A. Galinis, D. Miksys, V.V. Maltsev, N.I. Leonyuk, N.V. Kuleshov. Monolithic 1.5 μm Er,Yb:GdAl₃(BO₃)₄ eye-safe laser. Optical Materials, 2019, Vol.88(1), pp.60-66.
3. E. Cavalli, N.I. Leonyuk. Comparative investigation on the emission properties of RAl₃(BO₃)₄ (R = Pr, Eu, Tb, Dy, Tm, Yb) crystals with the huntite structure. Crystals, 2019, Vol.9(44), pp.1-11.
4. N. I. Leonyuk, V. V. Maltsev, E. A. Volkova, E. V. Koporulina, N. V. Kuleshov, V. E. Kisel, K.N. Gorbachenya. Ytterbium and Erbium Co-doped Rare-Earth Aluminum Borate Crystals as New Materials for Eye-Safe Lasers: Flux Growth and Characterization, pp. 1-46. In Handbook of Ecomaterials, Ed, by L.M.T. Martinez et al. Springer International Publishing AG. Part of Springer Nature, 2018.
5. V.V. Maltsev, D.A. Naprasnikov, A.D. Lyasniko, N.I. Leonyuk, K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, N.V. Kuleshov. Flux growth, thermal properties, and luminescence spectra of (Er,Yb,Lu)Al₃(BO₃)₄ solid solutions. Inorganic Materials, 2018, Vol.54(8), pp.826-830.
6. N.I. Leonyuk. Half a century of progress in crystal growth of multifunctional borates RAl₃(BO₃)₄ (R = Y, Pr, Sm - Lu). J. Crystal Growth, 2017, Vol. 476, pp.69-77.
7. D.A. Naprasnikov, V.V. Maltsev, N.I. Leonyuk, K.N. Gorbachenya, S.V. Kurilchik, V.E. Kisel, N.V. Kuleshov. Micro-crystallization and spectroscopic properties of (Er,Yb):RAl-borates (R=Y,Gd) obtained in RAl₃(BO₃)₄-K₂Mo₃O₁₀-B₂O₃-R₂O₃ and RAl₃(BO₃)₄-B₂O₃ systems. J. Crystal Growth, 2017, Vol. 457, pp.302-306.
8. E. A. Volkova, V. V. Maltsev, N. I. Leonyuk. Flux growth of NdAl₃(BO₃)₄ single crystals from a K₂Mo₃O₁₀ based system. CrystEngComm, 2017, Vol.19, pp.1071-1075.
9. K. Gorbachenya, V. Kisel, A. Yasukevich, P. Loiko, X. Mateos, V. Maltsev, N. Leonyuk, M. Aguilo, F. Diaz, U. Grienberg, V. Petrov, N. Kuleshov. Graphene Q-switched Er,Yb:GdAl₃(BO₃)₄ laser at 1550 nm. Applied Optics, 2017, Vol.56(16), pp.4745-4749.

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10. K. Gorbachenya, V. Kisel, A. Yasukevich, M. Prudnikova, N. Kuleshov, V. Maltsev, N. Leonyuk, S. Choi, F. Rotermund. Passively Q-switched Er,Yb:GdAl₃(BO₃)₄ laser with single-walled carbon nanotube based saturable absorber. *Laser Physics Letters*, 2017, Vol. 14(3), pp.035802-035807
 11. E. Volkova, V. Markin, N.I. Leonyuk. High-temperature growth and characterization of (Er,Yb):YAl₃(BO₃)₄ single crystal layers. *J. Crystal Growth*, 2017, Vol.468, pp.258-261.
 12. E.A. Dobretsova, K.N. Boldyrev, M.N. Popova, S.Yu. Gavrilkina, A.A. Mukhin, V.Yu. Ivanov, V.V. Maltsev, N.I. Leonyuk, B.Z. Malkin. Phase transitions and exchange interactions in the SmCr₃(BO₃)₄ crystal. *EPJ Web of Conferences*, 2017, Vol.132, Art.02008.
 13. E.A. Dobretsova, K.N. Boldyrev, V.A. Chernyshev, V.P. Petrov, V.V. Maltsev, N.I. Leonyuk. Infrared spectroscopy of europium borates EuM₃(BO₃)₄ (M = Al, Cr, Fe, Ga) with a huntite mineral type of structure. *Bulletin of the Russian Academy of Sciences: Physics*, 2017, Vol.81(5) pp.546–550.
 14. N.V. Kononets, O.G. Viagin, V.V. Seminko, P.O. Maksimchuk, E.V. Koporulina, N.I. Leonyuk, Y.V. Malyukin. Quantum splitting in LaAl_{2.07}(B₄O₁₀)O_{0.6}:Pr³⁺ crystals at X-ray excitation. *Spectroscopy Letters*, 2017, Vol.50(7), pp.359-363.
 15. B.B. Мальцев, Н.И. Леонюк. Кристаллогенезис в многокомпонентных боратных системах. Сб.публ. IX ежегодных научных чтений им. Г.П. Кудрявцевой. М: МГУ, 2017.
 16. V.V. Maltsev, N.I. Leonyuk, D.A. Naprasnikov, K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, N.V. Kuleshov. Flux growth and laser-related spectroscopic properties of (Er,Yb):LuAl₃(BO₃)₄ crystals. *CrystEngComm*, 2016, Vol. 18, pp.2725-2734.
 17. K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, V.V. Maltsev, N.I. Leonyuk, N.V. Kuleshov. Eye-safe 1.55 μm passively Q-switched Er,Yb:GdAl₃(BO₃)₄ diode-pumped laser. *Optics Letters*, 2016, Vol. 41, Iss. 5, pp.918-921.
 18. D. A. Naprasnikov, V. V. Maltsev, N. I. Leonyuk. YAl₃(BO₃)₄- and GdAl₃(BO₃)₄-based glass-ceramic composites. *Inorganic Materials*, 2016, Vol. 52, Issue 1, pp 68-75
 19. E.A. Dobretsova, K.N. Boldyrev, M.N. Popova, V.A., Chernyshev, E.Yu. Borovikova, V.V. Maltsev, N. I. Leonyuk. Vibrational spectroscopy of GdCr₃(BO₃)₄: quantitative separation of crystalline phases. *Journal of Physics: Conference Series (JPCS)*. 2016, Vol.737, Art. 012035.
 20. O. K. Kuvandikov, N. I. Leonyuk, Kh. O. Shakarov Z. M. Shodiev, B. U. Amonov. Magnetic properties of rare-earth aluminoborates RAl₃(BO₃)₄ (R = Tb, Er, or Ho) at high temperatures. *Russian Physics Journal*, 2016, Vol. 58, Issue 9, pp 1233-1236.
 21. D.A. Naprasnikov, V.V. Maltsev, N.I. Leonyuk, K.N. Gorbachenya, S.V. Kurilchik, V.E. Kisel, N.V. Kuleshov. Micro-crystallization and spectroscopic properties of (Er,Yb):RAl-borates (R=Y,Gd) obtained in RAl₃(BO₃)₄-K₂Mo₃O₁₀-B₂O₃-R₂O₃ and RAl₃(BO₃)₄-B₂O₃ systems. *J. Crystal Growth*, 2017, Vol. 457, pp.302-306.
 22. V.V. Maltsev, N.I. Leonyuk, D.A. Naprasnikov, K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, N.V. Kuleshov. Flux growth and laser-related spectroscopic properties of (Er,Yb):LuAl₃(BO₃)₄ crystals. *CrystEngComm*, 2016, Vol. 18, pp.2725-2734.
 23. K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, V.V. Maltsev, N.I. Leonyuk, N.V. Kuleshov. Eye-safe 1.55 μm passively Q-switched Er,Yb:GdAl₃(BO₃)₄ diode-pumped laser. *Optics Letters*, 2016, Vol. 41, Iss. 5, pp.918-921.
 24. D. A. Naprasnikov, V. V. Maltsev, N. I. Leonyuk. YAl₃(BO₃)₄- and GdAl₃(BO₃)₄-based glass-ceramic composites. *Inorganic Materials*, 2016, Vol. 52, Issue 1, pp.68-75.
 25. O. K. Kuvandikov, N. I. Leonyuk, Kh. O. Shakarov Z. M. Shodiev, B. U. Amonov. Magnetic properties of rare-earth aluminoborates RAl₃(BO₃)₄ (R = Tb, Er, or Ho) at high temperatures. *Russian Physics Journal*, 2016, Vol. 58, Issue 9, pp.1233-1236.
 26. E.Yu. Borovikova, K.N. Boldyrev, S.M. Aksenov, E.A. Dobretsova, V.S. Kurazhkovskaya, N.I. Leonyuk, A.E. Savon, D.V. Deyneko, D.A. Ksenofontov. Crystal growth, structure, infrared

- spectroscopy and luminescent properties of rare-earth gallium borates $RGa_3(BO_3)_4$, $R = Nd - Er$, Y. Optical Materials, 2015, v. 49, pp. 304-311.
27. O.V. Kharissova, E.M. Kopnin, V.V. Maltsev, N.I. Leonyuk, L.M.L. Rossano, I.Yu. Pinus, B.I. Kharisov. Recent advances on bismuth based 2223 and 2212 superconductors: synthesis, chemical properties and principal applications. Critical Reviews in Solid State and Materials Sciences, 2014, Vol.39, pp.253–276.
28. E.A. Dobretsova, E.Yu. Borovikova, K.N. Boldyrev, V.S. Kurazhkovskaya, N.I. Leonyuk. IR spectroscopy of rare-earth aluminum borates $RA_3(BO_3)_4$ ($R = Y, Pr-Yb$). Optics and Spectroscopy, 2014, Vol. 116, Issue 1, pp.77-83.
29. V.V. Maltsev, E.V. Koporulina, N.I. Leonyuk, K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, N.V. Kuleshov. Crystal growth of CW diode-pumped $(Er^{3+}, Yb^{3+}):GdAl_3(BO_3)_4$ laser material. J. Crystal Growth, 2014, Vol. 401, pp. 807–812.
30. E.A. Volkova, V.V. Maltsev, O.V. Kolganova, N.I. Leonyuk. High-temperature growth and comparative characterization of $(Er, Yb):YAl_3(BO_3)_4$ and $NdAl_3(BO_3)_4$ epitaxial layers. J. Crystal Growth, 2014, Vol. 401, pp. 547–549.
31. O.K. Kuvandikov, N.I. Leonyuk, K.O. Shakarov, Z.M. Shodiev, B.U. Amonov, U.É. Nurimov, O.A. Sulaimonov. Magnetic properties of rare earth ferro- and aluminoborates $RM_3(BO_3)_4$ ($M = Fe$ or Al and $R = Y, Gd, Er$, or Dy). Russian Physics Journal, 2014, Vol. 56, Issue 12, pp.1398-1402.
32. K.N. Gorbachenya, V.E. Kisel, A.S. Yasukevich, N.V. Kuleshov, V.V. Maltsev, N.I. Leonyuk. High efficient continuous-wave diode-pumped $Er, Yb:GdAl_3(BO_3)_4$ laser. Optics Letters, 2013, Vol. 38, Iss. 14, pp.2446–2448.
33. E.Yu. Borovikova, E.A. Dobretsova, K.N. Boldyrev, V.S. Kurazhkovskaya, V.V. Maltsev, N.I. Leonyuk. Vibrational spectra and factor group analysis of rare-earth chromium borates, $RCr_3(BO_3)_4$, with $R = La - Ho$. Vibrational Spectroscopy, 2013, Vol. 68, pp.82-90.
34. V.E. Kisel, K.N. Gorbachenya, A.S. Yasukevich, A.M. Ivashko, N.V. Kuleshov, V.V. Maltsev, and N.I. Leonyuk. Passively Q-switched microchip $(Er, Yb):YAl_3(BO_3)_4$ diode-pumped laser. Optics Letters, 2012, Vol. 37, Iss. 13, pp. 2745–2747.
35. K.N. Boldyrev, M.N. Popova, M. Bettinelli, V.L. Temerov I.A. Gudim, L.N. Bezmaternykh, P. Loiseau G. Aka, N.I. Leonyuk. Quality of the rare earth aluminum borate crystals for laser applications, probed by high-resolution spectroscopy of the Yb^{+3} ion. Optical Materials, 2012, Vol. 34, pp.1885-1889.
36. F. Capitelli, G. Chita, N.I. Leonyuk, E.V. Koporulina, F. Bellatreccia, G. Della Ventura. $REEAl_{2.07}(B_4O_{10})O_{0.60}$ dimetaborates ($REE = La, Pr$); synthesis and X-ray structural characterization. Zeitschrift fur Kristallographie, 2011, Vol. 226, pp. 219-225.
37. E.A. Volkova, D.A. Ksenofontov, V.V. Maltsev, N.I. Leonyuk, Yu.K. Kabalov, S.N. Barilo, G.L. Bychkov, N.A. Tolstik, N.V. Kuleshov. Liquid phase epitaxy of $(Er, Yb):YAl_3(BO_3)_4$ single crystal layers for planar waveguides. Inorganic Materials, 2011, Vol. 47, No 9, pp.979-982.
38. V.S. Kurazhkovskaya, E.A. Dobretsova, E.Yu. Borovikova, V.V. Maltsev, N.I. Leonyuk. Infrared spectroscopy and the structure of rare earth chromium borates $RCr_3(BO_3)_4$ ($R=La-Er$). Journal of Structural Chemistry, 2011, Vol.52, No 4, pp.699-707.
39. N.A. Tolstik, V.E. Kisel, N.V. Kuleshov, V.V. Maltsev, E.V. Koporulina, N.I. Leonyuk. Energy transfer between Yb^{3+} and Er^{3+} ions in an $(Er, Yb):YAl_3(BO_3)_4$ crystal. Optics and Spectroscopy, 2011, Vol.111, No 1, pp.74-78.
40. N.A. Gromalova, V.V. Maltsev, G.I. Dorokhova, N.I. Leonyuk, V.S. Urusov. Re-crystallization of natural chrysoberyl and alexandrite crystallites. Crystallography Reports, Vol. 57, No 6, 2011.
41. N. Tolstik, S. Heinrich, A. Kahn, E. Volkova, V. Maltsev, N. Kuleshov, G. Huber, N. Leonyuk High-temperature growth and spectroscopic characterization of $Er, Yb:YAl_3(BO_3)_4$ epitaxial thin layers. Optical Materials, Vol. 32, 2010, pp. 1377-1379.

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42. J.Y. Wang, H.J. Zhang, M.H. Jiang, M.N. Nikitina, V.V. Maltsev, N.I. Leonyuk. Flux growth and external morphology of KTiOPO_4 crystals. *Crystal Growth & Design*, Vol. 9. Issue 2, 2009, pp. 1190-1193.
43. E. Cavalli, E. Volkova, G. Calestani, N. Leonyuk Structural and morphological characterization of flux grown $\text{YTa}_7\text{O}_{19}$, $\text{Nd:YTa}_7\text{O}_{19}$, $\text{Nd:LaTa}_7\text{O}_{19}$ and $\text{NdTa}_7\text{O}_{19}$ crystals. *Materials Research Bulletin*, Vol. 44, Issue 5, 2009, pp. 1127-1131.
44. N.I. Leonyuk, V.V. Maltsev, E.A. Volkova, E.V. Koporulina, N.V. Nekrasova, N.A. Tolstik, N.V. Kuleshov. High-temperature crystallization of novel rare-earth borate materials: single crystals and thin films. *Journal of Physics: Condense Series*, Vol. 176, 2009, article 01210.
45. F. Capitelli, G. Chita, N.I. Leonyuk, E.V. Koporulina, F. Bellatreccia, G. Della Ventura. X-ray crystal structure of synthetic $\text{REEAl}_{2.07}(\text{B}_4\text{O}_{10})_{0.60}$ (REE = (La,Ce); Ce; Nd) dimetaborates. *Zeitschrift für Kristallographie*, Vol. 224, 2009, pp. 478-483.
46. N.A. Tolstik, V.E. Kisel, N.V. Kuleshov, V.V. Maltsev, N.I. Leonyuk. Er, Yb: $\text{YAl}_3(\text{BO}_3)_4$ – efficient 1.5 μm laser crystal. *Appl. Phys.*, Vol. B 97, 2009, pp. 357-362.
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49. V.V. Maltsev, E.A. Volkova, N.I. Leonyuk, N.A. Tolstik, N.V. Kuleshov. Highly efficient Er- and Yb – doped $\text{YAl}_3(\text{BO}_3)_4$ laser materials: crystal growth and characterization. *J. Optoelectronics and Advanced Materials*, Vol. 10, No. 11, 2008, pp. 2890-2893.
50. E.V. Kortunova, N.G. Nikolaeva, P.P. Chvanski, V.V. Maltsev, E.A. Volkova, E.V. Koporulina, N.I. Leonyuk, T.F. Kuech. Hydrothermal synthesis of improved ZnO crystals for epitaxial growth of GaN thin films. *Journal of Materials Science*, 43 (7), 2008, pp. 2336-2341.
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53. O.V. Pilipenko, V.V. Maltsev, E.V. Koporulina, N.I. Leonyuk, N.A. Tolstik, N.V. Kuleshov. Growth of (Yb,Er): $\text{YAl}_3(\text{BO}_3)_4$ laser crystals. *Crystallography Reports*, Vol. 53, № 2, 2008, pp. 336-338.
54. T.K. Karipidis, V.V. Maltsev, E.A. Volkova, M.V. Chukichev, N.I. Leonyuk. Thermal stability of zincite single crystals. *Crystallography Reports*, Vol. 53, № 2, 2008, pp. 326-330.
55. N.I. Leonyuk. Growth of new optical crystals from boron-containing fluxes. *Crystallography Reports*, Vol. 53, № 3, 2008, pp. 511-518.
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