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Akademicheskya Str.1, Kharkov 61108, Ukraine

**RESEARCH
EXPERIENCE**NSC “Kharkov Institute of Physics & Technology”, Kharkov 61108,
Ukraine

2003-present

Leading research staff member

1988-2003

Senior research staff member

1979-1988

Research staff member

DEGREES

1997

D.Sc. in Physics & Mathematics,
Institute for Single Crystals, Academy of Science of the Ukraine.
Thesis: "Theory of evolution and self-organization of extended defects
in metals under irradiation"

1987

Ph.D. in Physics & Mathematics,
Institute for Single Crystals, Academy of Science of the Ukraine.
Thesis: "Theory of evolution of the void ensemble in crystals under
irradiation"

1979

M.S. Degree with High Honor in Physics.
Kharkov State University, Kharkov, Ukraine**EDUCATION**

1973-1979

Kharkov State University, Kharkov, Ukraine

**FIELDS OF
INTEREST**Radiation effects and defects in crystalline solids
Self-organization of crystal defects under irradiation
Kinetics of phase transformations in non-equilibrium systems
Localized excitations in nonlinear complex systems**INTERNATIONAL
GRANTS**

1994-1996

The International Science Foundation long-term grants U26000-U26200
for "Self-organization of Extended Defects under Irradiation”

1999-2000

NATO Linkage Grant CRG.LG 973314 "Investigation of Radiation
Damage in Artificial and Natural NaCl"

2001-2002

NWO-NATO Grant #NB 67-292 " Investigation of Microstructure
Evolution in NaCl under Irradiation "

2001-2004

STCU Grant #P-049 "Evolution of Dislocation Microstructure in
Zr-2.5Nb Pressure Tubes"

2004

NWO-NATO Grant “Investigation of Nucleation and Growth of
Radiation-Induced Defects in Ionic Crystals”

2002-2005:

STCU Grant #1761 “Investigation of the effects of irradiation and
diffusion on natural rocks considered for safe storage and disposal of
nuclear waste”

2007-2009

STCU-NASU Grant #4368 “Radiation-induced recovery of nuclear
materials”

2008-2009

RFFI-NASU Grant 34/35-2008 “Effect of relaxation of radiation-
induced electronic excitations on radiation damage of dielectrics used
for utilization and disposal of composite nuclear fuel”

2009-2011	STCU-NASU Grant #4962 “Radiation-induced recovery of materials and its effect on the nuclear plant life”
2010-2012	STCU-NASU Grant #5228 “Sensors of photoelectric and ionizing radiations based on layered semiconductors”
2011-2013	STCU-NASU Grant #5497 “Prediction of the service life of WWER RPV with account of radiation-induced hardening and softening”

PUBLICATIONS More that 80 papers in refereed journals

SUMMARY OF SCIENTIFIC MERIT AND RESEARCH IMPACT:

Proposed a theory of «superdislocations», i.e. one-dimensional pile-ups of dislocation loops, formed in irradiated metals (1985) [1, 9].

Derived kinetic equations describing diffusion in fluctuative medium (1990) [5].

Proposed a mechanism of radiation-induced coarsening of void ensemble, which extends the LSW theory of the Oswald ripening to the field of radiation effects. The mechanism controls the ultimate void number density under high dose irradiation (1986-1989) [3].

Proposed a theory of self-organization of void and gas bubble in super-lattices based upon the dislocation-induced mechanism of interaction between cavities (1986-1989) [2, 4].

Proposed a new approach to the problem of bubble-void transition under irradiation that took into account the cavity bias for point defect absorption (1993-1995) [7].

Developed theory of void lattice formation and swelling saturation taking into account a cascade mechanism of interstitial dislocation loop production and absorption of loops by voids (1991-1999) [6, 8, 12, 13].

Developed a theory of the radiolysis in ionic crystals based upon a new mechanism of dislocation climb (1997-2002) [14-27].

Developed a kinetic approach to the nucleation problem in non-equilibrium systems, such as the void nucleation under irradiation (2001-2002) [28].

Proposed a mechanism of the radiation induced emission of Schottky defects and considered its effect on the radiation induced evolution of microstructure in metals and ionic crystals (2002-2004) [29-34].

Evaluated dependence of the dislocation loop bias on the loop size and microstructure density, and developed a closed set of rate equations describing simultaneous evolution of vacancy and interstitial dislocation loops (2005-2006) [35, 36].

Proposed and developed a new mechanism of irradiation creep based on the radiation-induced vacancy emission from dislocations (2005-2010) [37, 49].

Developed a theory of irradiation hardening of reactor pressure vessel steels due to the dislocation loop evolution, which for the first time has taken into account simultaneous evolution of vacancy and interstitial dislocation loops (2009) [43].

Proposed and developed a concept of radiation-induced recovery of materials based on the interaction of crystal defects with anharmonic lattice excitations (2007-2010) [38, 41, 42, 44, 45, 47].

Predicted theoretically and discovered experimentally phenomena of the radiation-induced void “annealing” under low temperature or high dose rate irradiation (2005-2010) [31, 32, 41, 46, 48]

Proposed a model and explored experimentally the radiation-induced softening (RIS) of metals observed in situ under electron and neutron irradiation (2008-2011) [40, 45].

LIST OF MAJOR PUBLICATIONS:

1. V. I. Dubinko, A. A. Turkin and V.V. Yanovsky, *Piles of dislocation loops in real crystals*, Phys. Metall. 59 (1985), No 2, p.71; No 4, p.54.
2. V. I. Dubinko, V.V. Slezov, A.V. Tur and V.V. Yanovsky, *The theory of gas bubble lattice*, Radiat. Eff. 100 (1986) 85-104.
3. V. I. Dubinko, P.N. Ostapchuk and V. V. Slezov, *Theory of radiation induced and thermal coarsening of the void ensemble in metals under irradiation*, J. Nucl. Mater. 161(1989) 239-260.
4. V. I. Dubinko, A. V. Tur, A. A. Turkin and V. V. Yanovsky, *A mechanism of formation and properties of the void lattice in metals under irradiation*, J. Nucl. Mater. 161 (1989) 57-71.
5. V. I. Dubinko, A. V. Tur, A. A. Turkin and V. V. Yanovsky, *Diffusion in fluctuative medium*, Radiat. Eff. and Defects in Solids 112 (1990) 233-243.
6. V. I. Dubinko, *The influence of dislocation structure and impurities on the void lattice formation in crystals under irradiation*, J. Nucl. Mater. 178 (1991) 108-113.
7. V. I. Dubinko, *New insight on bubble-void transition effects in irradiated metals*, J. Nucl. Mater. 206 (1993) 1-21.
8. V. I. Dubinko and A. A. Turkin, *Self-organization of cavities under irradiation*, Appl. Phys. A58 (1994) 21-34.

9. A. A. Turkin and V. I. Dubinko, *Formation of dislocation patterns under irradiation*, Appl. Phys. A58 (1994) 35-39.
10. V. I. Dubinko, *Theory of irradiation swelling in materials with elastic and diffusional anisotropy*, J. Nucl. Mater. 225 (1995) 26-32.
11. V. I. Dubinko, V. R. Barabash, *Critical parameters controlling irradiation swelling in beryllium*, J. Nucl. Mater. 225 (1995) 22-25.
12. V. I. Dubinko, *Impact of glissile interstitial loop production in cascades on void ordering and swelling saturation under irradiation*, Nucl. Instr. and Meth. in Phys. Res. B102 (1995) 125-131.
13. V. I. Dubinko, *Temporal and spatial evolution of dislocation and void structures under cascade damage production*, Nucl. Instr. and Meth. in Phys. Research, B153 (1999) 116-121.
14. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *New formulation of the modeling of radiation-induced microstructure evolution in alkali halides*, Radiation Effects and Defects in Solids, 150 (1999) 145-149.
15. D. I. Vainshtein, V. I. Dubinko, A. A. Turkin, and H. W. den Hartog, *Void formation in heavily irradiated NaCl*, Radiation Effects and Defects in Solids, 150 (1999) 173-177.
16. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *Modeling of the radiation-induced microstructural evolution in ionic crystals*, Nucl. Instr. and Meth. in Phys. Research, B153 (1999) 163-166.
17. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *A New Mechanism for Radiation Damage Processes in Alkali Halides*, J. Appl. Phys, 86 (1999) 5957 –5960.
18. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *Theory of the late stage of radiolysis of alkali halides*, J. Nucl Mater. 277 (2000) 184-198.
19. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *Effect of Dose Rate, Temperature and Impurity Content on the Radiation Damage in the Electron Irradiated NaCl Crystals*, Nucl. Instr. and Meth. in Phys. Research, 166-167 (2000) 550-555.
20. D. I. Vainshtein, V. I. Dubinko, A. A. Turkin and H. W. den Hartog, *Effect of the void formation on the explosive decomposition of electron irradiated NaCl crystals*, Nucl. Instr. and Meth. in Phys. Research, 166-167 (2000) 561-567.
21. H. W. den Hartog, D. I. Vainshtein, V. I. Dubinko, A. A. Turkin, *Structural stability of rock salt under irradiation*, in: Proc. Int. Conf. on the Safety of Radioactive Waste Management, Cordoba, Spain, March 2000, IAEA-CN-78/23.
22. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *New mechanism for radiation defect production and aggregation in crystalline ceramics*, J. Nucl. Mater., 289 (2001) 86-91.
23. D.I. Vainshtein, H. W. den Hartog, V. I. Dubinko, A. A. Turkin, *Critical parameters controlling mechanical stability of NaCl under irradiation*, Radiation Effects&Defects in Solids, 156 (2001) 51-57.
24. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *Diffusion plus explosion mechanism of void-crack transition in irradiated NaCl*, Radiation Effects&Defects in Solids, 156 (2001) 27-31.
25. A. A. Turkin, V. I. Dubinko, D. I. Vainshtein, H. W. den Hartog, *Kinetics of back reaction between radiolytic products initiated by radiation-induced voids in NaCl*, J. Phys: Condens. Matter, 156 (2001) 203-216.

26. H. W. den Hartog, D. I. Vainshtein, V. I. Dubinko, A. A. Turkin, *New scenario for the accumulation and release of radiation damage in rock salt and related materials*, Nuclear Inst. and Methods in Physics Research, B, 191 (2002) 168-172.
27. A. A. Turkin, V. I. Dubinko, D. I. Vainshtein, H. W. den Hartog, *A model for voids-induced back reaction between radiolytic products in NaCl*, Nuclear Inst. and Methods in Physics Research, B, 191 (2002) 83-88.
28. V. I. Dubinko, A. A. Turkin, D. I. Vainshtein, H. W. den Hartog, *Kinetics of nucleation and coarsening of colloids and voids in crystals under irradiation*, J. Nucl. Mater., 304 (2002) 117-128.
29. V. I. Dubinko, *New principles of radiation damage and recovery based on the radiation induced emission of Schottky defects*, arXiv/cond-mat/0212154.
30. V. I. Dubinko, D. I. Vainshtein, H. W. den Hartog, *Effect of the radiation-induced emission of Schottky defects on the formation of colloids in alkali halides*, Radiat. Eff. and Defects in Solids, 158 (2003) 705-719.
31. N. P. Lazarev, V. I. Dubinko, *Molecular dynamics simulation of defects production in the vicinity of voids*, Radiat. Eff. and Defects in Solids, 158 (2003) 803 -808.
32. V. I. Dubinko, N. P. Lazarev, *Effect of the radiation-induced vacancy emission from voids on the void evolution*, Nuclear Inst. and Methods in Physics Research, B. 228 (2005) 187-192.
33. V. I. Dubinko, D. I. Vainshtein, H. W. den Hartog, *Mechanism of void growth in irradiated NaCl based on exciton-induced formation of divacancies at dislocations*, Nuclear Inst. and Methods in Physics Research, B. 228 (2005) 304-308.
34. V. I. Dubinko, A. A. Turkin, A. S. Abyzov, A.V.Sugonyako, D. I. Vainshtein, H. W. den Hartog, *Nucleation and growth of sodium colloids in NaCl under irradiation: theory and experiment*, Phys.Stat.Sol. (c), 2, No 1 (2005) 438-443.
35. V. I. Dubinko, A. S. Abyzov, A. A. Turkin, *Numerical evaluation of the dislocation loop bias*, J. Nucl. Mater., 336 (2005) 11-21.
36. V. I. Dubinko, A. A. Turkin, A. S. Abyzov, M. Griffiths, *“Modeling of the simultaneous evolution of vacancy and interstitial dislocation loops in hcp metals under irradiation “*, Journal of ASTM Int. 3 (2006) No 1, 157-176.
37. V. I. Dubinko, *New mechanism of irradiation creep based on the radiation-induced vacancy emission from dislocations*, Radiat. Eff. and Defects in Solids, 160 (2005) 85-97.
38. V.I. Dubinko, V.F. Klepikov, *The influence of non-equilibrium fluctuations on radiation damage and recovery of metals under irradiation*, J. Nuclear Materials, 362 (2007) 146–151,
39. V. I. Dubinko, A.N. Dovbnya, D. I. Vainshtein, H. W. den Hartog, *Simulation of radiation damage in rocks considered for safe storage of nuclear waste*, Proc. Int. Conf. Waste Management and the Environment IV, 2 - 4 June, 2008, Granada, Spain, P. 891-899.
40. V.I. Dubinko, V.F. Klepikov, *Kinetic Mechanism of the Electroplastic Effect in Metals*, Bulletin of the Russian Academy of Sciences: Physics, 72 (2008) No. 9, 1188–1189.
41. V. I. Dubinko, A.G. Guglya, E. Melnichenko, R. Vasilenko, *Radiation-induced reduction in the void swelling*, J. Nuclear Materials 385 (2009) 228-230.
42. V. I. Dubinko, *Breather mechanism of the void ordering in crystals under irradiation*, Nuclear Inst. and Methods in Physics Research, B 267 (2009) 2976–2979.
43. V.I. Dubinko, S.A. Kotrechko, V.F. Klepikov, *Irradiation hardening of reactor pressure vessel steels due to the dislocation loop evolution*, Radiation Effects & Defects in Solids, 164 (2009) No 10, 647-655.

44. V.I. Dubinko, *Mechanisms of recovery of radiation damage based on the interaction of quodons with crystal defects*, DCDS-S, 4 (2011) No 5, 1119-1128
45. V. I. Dubinko, P. A. Selyshchev, and J. F. R. Archilla, *Reaction-rate theory with account of the crystal anharmonicity*, Phys. Rev. E 83 (2011) No 4, doi: 10.1103/PhysRevE.83.041124.
46. V.I. Dubinko, A.G. Guglya, S.E. Donnelly, *Radiation-induced formation, annealing and ordering of voids in crystals: theory and experiment*, COSIRES 2010, Nuclear Inst. and Methods in Physics Research, B269 (2011) 1634–1639.
47. V.I. Dubinko, F.M. Russell, *Radiation damage and recovery due to the interaction of crystal defects with anharmonic lattice excitations*, J. Nuclear Materials, (2011) doi: 10.1016/j.jnucmat.2011.07.014.
48. V.I. Dubinko, *Radiation damage and recovery of crystals: Frenkel vs. Schottky defect production*, In: Nuclear Materials, Editor: Michael P. Hemsworth, 2011 Nova Science Publishers, Inc.