Scopus Author ID: 56634205600

https://scholar.google.com.ua/citations?user=VcWN4HwAAAAJ&hl=ru

CURRICULUM VITAE
Nina Krainyukova

PROFESSIONAL BACKGROUND

Physicist (M.Sc.), Kharkiv State University, Kharkiv, Ukraine

Junior Researcher, 1978, B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine (NASU)

Candidate of Sciences (Ph.D), 1989, B. Verkin Institute for Low Temperature Physics and Engineering of NASU

Research Scientist, 1989, B. Verkin Institute for Low Temperature Physics and Engineering of NASU

Senior Research Scientist, B. Verkin Institute for Low Temperature Physics and Engineering of NASU since 2007 till now

Doctor of Sciences (habil.) in Physics & Mathematics, 2021, B. Verkin Institute for Low Temperature Physics and Engineering of NASU

Research interests: structural studies of solids and single crystal surfaces; clusters and nanostructures (theory and experiment); carbon nanostructures especially carbon honeycomb discovered by her; cryocrystals

Grants, Projects and International Cooperation:

In the **late 1990s** there was developed a perspective methodology for the study of the structure and dynamic properties of atomically smooth single crystal surfaces - RHEED (Reflection High Energy Electron Diffraction), which is unique in application to the low temperature region. This work was supported by the **Grant of the International Science Foundation (ISF) U9P000** and the **Grant U9P200 from the Joint Fund of the Government of Ukraine and ISF** (**PI Dr. N.V. Krainyukova**).

1998 – 2004 Clusters of solidified gases (cryocrystal clusters) were studied in cooperation with Twente University (The Netherlands) with **Dr. Benjamin W. van de Waal (PI)**. There was shown that structures with fivefold symmetry dominate in rare gas clusters with sizes less than 10^4 atoms. This wark was supported by the **NATO Grant PST-CLG974849**.

2006 – 2007 Clusters of solidified noble gases that form so-called impurity-helium solids after injection into superfluid helium were investigated by means of X-Ray diffraction at Light Source in Brookhaven in cooperation with the group from USA leading by the **Nobel Laureate Prof David Lee**. The relevant paper was published in ***Phys. Rev. Lett.* 98**, 195506 (2007).

2011 – 2012 There was shown for the first time in cooperation with the group of the **Nobel Laureate Prof David Lee** that in ensembles of clusters of solidified noble gases the transition between FCC and HCP structures occurs at low pressures. The results presented in ***Phys. Rev. Lett*. 109,** 245505 (2012).

2009 – to this time N.V. Krainyukova had first synthesized a new form of carbon – carbon honeycombs, studied their structure using electron diffraction and nanostructure-specific analysis, and also conducted a study of their sorption capabilities for several gases. Electron microscopy of honeycomb films was performed by Doctor of Physical and Mathematical Sciences E.N. Zubarev from the National Technical University "Kharkiv Polytechnic Institute". A number of publications and projects were devoted to this topic.

2016 – 2017 Joint work on the study of a new carbon form - carbon honeycombs in cooperation with **Prof Boris I. Jacobson (Rice University, Houston, USA).**

2016 – 2017 The hopping precession of molecules in carbon dioxide solid films was studied by means of Transmission High Energy Electron Diffraction (THEED) in cooperation with **Prof Bogdan Kuchta (Aix-Marseille Université, France).**

2019 – 2020 Joint Ukraine – Latvia R&D Grant "Low temperature characterization and ab-initio calculations of anomalous behavior of structural, luminescent and conductivity properties of ABO_3 perovskite surfaces" (**PI from Latvia Prof. E.A. Kotomin, PI from Ukraine Dr. N.V. Krainyukova**).

2022 – 2023 Grant of NASU "Structural, sorptional, mechanical and electrophysical properties of nanocomposite materials based on graphene, fullerene and carbon honeycombs" under the program "Support of development of the priority research areas" (**PI Dr. N.V. Krainyukova**).

2022 – 2024 Research fellowship on the study of the properties of single-crystal cuprate films and perovskite surfaces at the Max Planck Institute for Solid State Research (Stuttgart, Germany).

SELECTED PUBLICATIONS

1. N.V. Krainyukova, E.N. Zubarev, Carbon honeycomb high capacity storage for gaseous and liquid species, *Phys. Rev. Lett*. 116, 055501 (2016) http://dx.doi.org/10.1103/PhysRevLett.116.055501

2. Z. Zhang, A. Kutana, Y. Yang, N.V. Krainyukova, E.S. Penev, B.I. Yakobson, Nanomechanics of carbon honeycomb cellular structures, *Carbon* 113, 26 (2017) http://dx.doi.org/10.1016/j.carbon.2016.11.020

3. N.V. Krainyukova, Capturing Gases in Carbon Honeycomb, *J. Low Temp. Phys*. 187, 90 (2017) https://doi.org/10.1007/s10909-016-1727-1

4. N.V. Krainyukova, Evidence for high saturation of porous amorphous carbon films by noble gases, *Low Temp. Phys*. 35, 294 (2009) https://doi.org/10.1063/1.3115812

5. N.V. Krainyukova, B. Kuchta, L. Firlej, P. Pfeifer, Absorption of atomic and molecular species in carbon cellular structures (Review article), *Low Temp. Phys*. 46, 219 (2020) http://dx.doi.org/10.1063/10.0000705

6. N.V. Krainyukova, Y.S. Bogdanov, B. Kuchta, Absorption–desorption of carbon dioxide in carbon honeycombs at elevated temperatures, *Low Temp. Phys*. 45, 325 (2019) https://doi.org/10.1063/1.5090090

7. D.G. Diachenko, N.V. Krainyukova, Structural variety and stability of carbon honeycomb cellular structures, *Low Temp. Phys*. 48, 232 (2022) http://dx.doi.org/10.1063/10.0009542

8. D.G. Diachenko, N.V. Krainyukova, E.A. Kotomin, Selective uptake and desorption of carbon dioxide in carbon honeycombs of different sizes, *Low Temp. Phys*. 48, 97 (2024) https://doi.org/10.1063/10.0023898

9. N.V. Krainyukova, V.O. Hamalii, L.L. Rusevich, E.A. Kotomin, J. Maier, Effect of 'in-plane' contraction on the (001) surface of the model perovskite $SrTiO_3$, *Appl. Surf. Sci.* 615, 156297 (2023) https://doi.org/10.1016/j.apsusc.2022.156297

10. N.V. Krainyukova, V.O. Hamalii, A.V. Peschanskii, A.I. Popov, E. A. Kotomin, Low temperature structural transformations on the (001) surfacee of $SrTiO_3$ single crystals, *Low Temp. Phys*. 46, 740 (2020) https://doi.org/10.1063/10.0001372

11. V.O. Hamalii, A.V. Peschanskii, A.I. Popov, N.V. Krainyukova, Intrinsic nanostructures on the (001) surface of strontium titanate at low temperatures, *Low Temp. Phys*. 46, 1170 (2020) https://doi.org/10.1063/10.0002470

12. N.V. Krainyukova, V.V. Butskii, Evidence for a low-temperature phase transition on the $SrTiO_3$ (001) surface, *Surf. Sci*. 454, 628 (2000) https://doi.org/10.1016/S0039-6028(00)00235-1

13. N.V. Krainyukova, V.V. Butskii, RHEED study of stepped (001) surface of strontium titanate, *Appl. Surf. Sci*. 235, 32 (2004) https://doi.org/10.1016/j.apsusc.2004.05.126

14. N.V. Krainyukova, V.V. Butskii, Incommensurability imposed by the low-temperature phase transition at the (001) surface of $SrTiO_3$, *Appl. Surf. Sci.* 235, 43 (2004) https://doi.org/10.1016/j.apsusc.2004.05.127

15. M.B. Kosmyna, B.P. Nazarenko, G.Kh. Rozenberg, V.P. Seminozhenko, V.M. Dmitriev, S.I. Kovalenko, N.V. Krainyukova, E.V. Khristenko, I.V. Zolochevskii, Liquid phase preparation of Bi-Sr-Ca-Cu-O film structures, *Sov. J. Low Temp. Phys*. 16, 479 (1990) https://doi.org/10.1063/10.0032651

16. V. Kiryukhin, E.P. Bernard, V.V. Khmelenko, R.E. Boltnev, N.V. Krainyukova, D.M. Lee, Noble-gas nanoclusters with fivefold symmetry stabilized in superfluid helium, *Phys. Rev. Lett*. 98, 195506 (2007) https://doi.org/10.1103/PhysRevLett.98.195506

17. N.V. Krainyukova, R.E. Boltnev, E.P. Bernard, V.V. Khmelenko, D.M. Lee, V. Kiryukhin, Observation of the fcc-to-hcp Transition in Ensembles of Argon Nanoclusters, *Phys. Rev. Lett*. 109, 245505 (2012) https://doi.org/10.1103/PhysRevLett.109.245505

18. O.G. Danylchenko, R.E. Boltnev, V.V. Khmelenko, V. Kiryukhin, O.P. Konotop, D.M. Lee, N.V. Krainyukova, Argon Nanoclusters with Fivefold Symmetry in Supersonic Gas Jets and Superfluid Helium, *J. Low Temp. Phys*. 187, 156 (2017) https://doi.org/10.1007/s10909-016-1720-8

19. N.V. Krainyukova, V.B. Efimov, L.P. Mezhov-Deglin, Instability of Small Deuterium Clusters in Superfluid Helium near the λ Point, *J. Low Temp. Phys*. 171, 718 (2013) https://doi.org/10.1007/s10909-012-0728-y

20. N.V. Krainyukova, 'The crystal structure problem' in noble gas nanoclusters, *Thin Solid Films* 515, 1658 (2006) https://doi.org/10.1016/j.tsf.2006.05.041

21. N.V. Krainyukova, B.W. van de Waal, Self-selection in size and structure in argon clusters formed on amorphous carbon, *Thin Solid Films* 459, 169 (2004) https://doi.org/10.1016/j.tsf.2003.12.126

22. N.V. Krainyukova, The energetics of large Lennard-Jones clusters: transition to the hexagonal close-packed structure, *Eur. Phys. J*. D 43, 45 (2007) https://doi.org/10.1140/epjd/e2007-00076-x

23. N.V. Krainyukova, On the Lattice Dynamics of Solid Helium and Supersolidity, *J. Low Temp. Phys*. 162, 441 (2011) https://doi.org/10.1007/s10909-010-0283-3

24. N.V. Krainyukova, On the Mechanism of the BCC-HCP Transformations in Small Lennard-Jones Crystals, *J. Low Temp. Phys*. 150, 317 (2008) https://doi.org/10.1007/s10909-007-9547-y

25. N.V. Krainyukova, Role of distortion in the hcp vs fcc competition in rare-gas solids, *Low Temp. Phys*. 37, 435 (2011) https://doi.org/10.1063/1.3606459

26. N.V. Krainyukova, On the Nature of Disorder in Solid ^{4}He, *J. Low Temp. Phys*. 158, 596 (2010) https://doi.org/10.1007/s10909-009-0014-9

27. N. Krainyukova, B. Kuchta, Hopping Precession of Molecules in Crystalline Carbon Dioxide Films, *J. Low Temp. Phys*. 187, 148 (2017) https://doi.org/10.1007/s10909-016-1717-3

28. N.V. Krainyukova, On surface melting of atomic cryocrystals, *Sov. J. Low Temp. Phys.* 14, 340 (1988) https://doi.org/10.1063/10.0031956

29. N.V. Krainyukova, Orientational ordering of molecules in small crystalline particles of nitrogen and carbon oxide, *Sov. J. Low. Temp. Phys*. 15, 349 (1989) https://doi.org/10.1063/10.0032198