

School of Physics and Technology of Karazin Kharkiv National University

Equipment and software needs:

1. Software

1.1. OriginPro;

1.2. COMSOL Multiphysics with annexes:

- Electromagnetics Modules: AC/DC, RF, Plasma;

- Multipurpose Products: Material Library, Particle Tracing Module, Liquid & Gas Properties Module.

1.3. Matlab.

1.4. "The Stopping and Range of Ions in Matter" (SRIM, Software by J.F. Ziegler includes: "Stopping, Range and Damage by Neutrons" and "SREM - Stopping and Range of Electrons").

1.5. GammaVision Gamma Spectroscopy (software GammaVision 8.10 by ORTEC).

1.6. MCNPX 6. RSICC CODE PACKAGE CCC-

810 <https://rsicc.ornl.gov/codes/ccc/ccc8/ccc-810.html>

1.7. MicroShield® Pro <https://radiationsoftware.com/>

1.8. PTC Mathcad Prime 8 <https://www.mathcad.com/en/>

1.9. SCALE 6 [https://www.oecd-nea.org/tools/abstract/detail/CCC-](https://www.oecd-nea.org/tools/abstract/detail/CCC-0834)

[0834 https://www.ornl.gov/content/scale-v624](https://www.ornl.gov/content/scale-v624)

1.10. Ansys 2022 R1 (ANSYS, Inc. Southpointe, 2600 Ansys Drive, Canonsburg, PA 15317, USA) <https://www.ansys.com/products/release-highlights>

1.11. VSim (Tech-X Corp.), <https://txcorp.com/vsim/>

2. Hardware

2.1. Vacuum equipment: Mass flow controllers; Pressure transducers (meters); vacuum posts, devices for plasma coating deposition;

2.2. Power supply for plasma devices: RF generators, DC and Pulsed magnetron power supplies.

2.3. Electron microscope. JEOL JSM-7500F

2.4. Foreline pumps. Agilent Varian DS402 – 4 items

2.5. Turbo molecular pumps. EVP FB-1600, EVP FB-1200, EVP FB-600 – 2 items

2.6. Data collectors (ADC with software). (Labjack T7 – 3 items)

2.7. Vacuum gauges. (Agilent FRG – 700 – 2 items)

2.8. Power sources, different. (KPS3050D, AMS1202D or analogue)

2.9. Voltage dividers (Magnetlab (DVT-1000 V05 – 5 items) and magnetic current sensors.

Magnetlab (5A to 4V – 4 items, 0.05A to 4 V – 4 items)

2.10. Vacuum accessories.

2.11. Spectrofluorimeter Shimadzu https://chemtest.com.ua/cpektrofluorimetr_rf-6000_shimadzu

2.12. Spectrophotometer Shimadzu <https://chemtest.com.ua/uv-spektrofotometr-uv-2600>

2.13. Computers with licensed Windows 10 (7 items)

2.14. Computer with powerful Graphics Card NVIDIA GeForce RTX 3080 Ti, 12 GB

2.15. Laboratory refrigerator with freezer https://chemtest.com.ua/kombinirovannyj_laboratoryj_holodilnik_morozilnik_lff_270

2.16. Laboratory aqua distiller https://chemtest.com.ua/distilyator_de_20

2.17. Laboratory thermostat https://chemtest.com.ua/termostat_tw-80_1

2.18. Laboratory pH meter Mettler-Toledo https://chemtest.com.ua/ph-metr_ionomer_mettler_toledo_s220_sevencompact

2.19. Analytical balance Radwag https://chemtest.com.ua/analiticheskie-vesi-radwag-as82_220.r2

- 2.20. Laboratory vortex https://chemtest.com.ua/vortex_mixer_sa8_stuart
- 2.21. Laboratory centrifuge MiniSpin plus <https://chemtest.com.ua/tsentryfuha-minispin-plus>
- 2.22. Laboratory drying oven <https://chemtest.com.ua/nizkotemperaturnaja-pech-sno1120-300lfn>
- 2.23. Laboratory magnetic stirrer
https://chemtest.com.ua/magnitnaya_meshalka_s_podogrevom_riva-03_1
- 2.24. Laboratory ultrasonic cleaner https://chemtest.com.ua/ua/ultrazvuky_moyka_jp_040-s_skyemen?filter=%26f125%3D248
- 2.25. Rotatory evaporator <https://chemtest.com.ua/ika-rv-basic-v>
- 2.26. Vacuum pump
https://chemtest.com.ua/vakuumnyj_nasos_n_026_at_9e_atex_vzryvozashhishhennyj_knf
- 2.27. Lab Micropipette (100-1000 µl) (3 items) https://chemtest.com.ua/dozator_dpop-1-100-1000_mkl_avtoklaviruemyj
- 2.28. Lab Micropipette (2-20 µl) (3 items) https://chemtest.com.ua/dozator_dpop-1-2-20_mkl_avtoklaviruemyj
- 2.29. Lab Micropipette (20-200 µl) (3 items) https://chemtest.com.ua/dozator_dpop-1-20-200_mkl
- 2.30. Laboratory table (3 items)
https://chemtest.com.ua/stol_laboratornii_pristennii_himicheskii
- 2.31. Laboratory table (4 items) https://chemtest.com.ua/stol_laboratotnyj_slp-304105
- 2.32. Laboratory dry box (1 item) https://chemtest.com.ua/shkaf_vytyazhnoj_shvl-02_900x220
- 2.33. Laboratory sink https://chemtest.com.ua/stol_moika_sml_0.091.10_150
- 2.34. Laboratory furniture (2 items) https://chemtest.com.ua/nadstroika_servisnaja_nsp-0.051.01_800
- 2.35. Laboratory ultrasonic bath
https://chemtest.com.ua/ua/ultrazvukova_laznya_sonorex_digitec_dt_31_h
- 2.36. Quartz cuvettes for spectrophotometry 10 mm (10 items)
https://micromed.ua/shop/produkcija_dlya_laboratoriy/laboratornaya_posuda_hs_ts/laboratornaya-posuda-steklyannaya/kuveta_kvartsevaya_10mm_dlya_spektrofotometra-2/
<https://spectrolab.com.ua/ua/p25756935-kyuveta-kvartsevaya.html>
- 2.37. Quartz cuvettes for spectrophotometry 2 mm (6 items)
<https://spectrolab.com.ua/ua/p500327983-kyuveta-kvartsevaya-2mm.html>
- 2.38. Quartz cuvettes for fluorimetry 10 mm (10 items)
<https://spectrolab.com.ua/ua/p501888924-kyuveta-kvartsevaya-fluorimetricheskaya.html>
- 2.39. Laboratory shaker <https://prostopylad.com.ua/uk/1-sheiker-laboratornyi-orbitalnyi-sho-10>
- 2.40. Digital camera for microscope <https://fotofox.com.ua/optika/mikroskopiya/kamery-dlya-mikroskopov/tsifrovaya-kamera-k-mikroskopu-sigeta-m3cmos-18000-18-0mp-usb3-0-detail>
- 2.41. Sources for no-break power supply (8 items)
- 2.42. Notebooks (4 items)
- 2.43. Multimedia projector
- 2.44. Screen for multimedia projector
- 2.45. Glass vials 4 ml <http://realab.kiev.ua/component/zoo/detalab-900204>

- 2.46. Glass vials 5 ml <http://realab.kiev.ua/component/zoo/deltalab-900205>
- 2.47. Digital Multichannel Analyzer (MCA-8000D Digital Multichannel Analyzer by Amptek)
2 pieces
- 2.48. Amplifier ORTEC 572A by ORTEC 2 pieces
- 2.49. Time to Amplitude converter ORTEC 566 by ORTEC
- 2.50. Preamplifier 109A by ORTEC
- 2.51. Preamplifier 142 AH by ORTEC
- 2.52. HPGe detector (V= 200 cm³, High Purity Germanium detector, GMX) by Canberra
- 2.53. Detector Scintillator+ PMT (LaBr₃(Ce), D15mm*15mm, D25mm*25mm) by ORTEC 2 pieces
- 2.54. High Voltage Power Supply (3 kV, 10 mA) ORTEC 556H by ORTEC 2 pieces
- 2.55. Gamma sources: Co-60, 105 c-1; Cs-137, 105 c-1 2 pieces each
- 2.56. Bins (NIM crate, 4001C) by ORTEC 2 pieces
- 2.57. 160-W Power Supply for NIM crate (4002D) by ORTEC 2 pieces
- 2.58. X-Ray & Gamma Ray Detector (XR-100CdTe, Beryllium Window) by Amptek
- 2.59. Digital Multichannel Analyzer (Amptek PX5 DPP, MCA and Power Supply) by Amptek
- 2.60. X-Ray Tube and Mini-X2 Controller (Mini-X2 X-Ray Tube and Mini-X2 Controller (50 kV, 4W, W anode)) by Amptek
- 2.61. Digital optical camera for microscope (Sigeta M3CMOS 14000 14.0MP USB3.0)
- 2.62. Oscilloscope RTM 3K-102 by ROHDE & SCHWARZ
- 2.63. Gamma dosimeter (E gamma < 3 MeV) by Canberra

2.64.	Grinding and polishing machine Bainpol-SA	https://ukrintech.com.ua/stanok-shlifovalno-polirovalnyj-bainpol-sa
2.65.	Abrasive cutting machine Baincut UM	https://chennaimetco.com/baincut-um/
2.66.	Metallographic microscope LV150ND, Nikon Metrology	https://www.nikonmetrology.com/en-us/industrial-microscopes/upright-microscopes-eclipse-lv150n
2.67.	Metallographic microscope Axioscope 5 + Software Zen	https://www.zeiss.com/microscopy/int/products/light-microscopes/axioscope-5-for-materials.html
2.68.	Hydraulic press for hot pressing Bainmount-H auto	https://ukrintech.com.ua/ua/pres-hidravlichnyi-dlia-hariachoho-zapresovuvannia-bainmount-h-auto
2.69.	JET HBS-1018W metal band saw	https://sm-tools.com.ua/p1434-lentochnaya_pila_po_metallu_jet_hbs-1018w
2.70.	Vibrating shaker Analysette 3" PRO FRITSCH wsth sieves and components	https://www.fritsch.com.ru/podgotovka-prob/rassev/vibracionnye-grokhoty/detali/produkty/analysette-3-pro/
2.71.	Planetary Micro Mill Pulverisette 7 premium line	https://www.fritsch-international.com/sample-preparation/milling/planetary-mills/details/product/pulverisette-7-premium-line/
2.72.	Universal hardness tester FALCON 611	https://www.innovatest-europe.com/products/falcon-600/
2.73.	Rockwell-hardness-tester	https://www.checkline.eu/cat/metal-hardness-testers?gclid=CjwKCAjwrqqSBhBbEiwAlQeqGuLrS-n5y3EHO7GKs6C8WRlceXw9Ic82ATedkZRicPNfQnaHs

		LzUHxoC4PIQAvD_BwE
2.74.	High Temperature Tribometer Anton Paar THT, 1000 °C	https://www.anton-paar.com/corp-en/products/details/high-temperature-tribometer-tht/
2.75.	Micro and Nano scratch tester (NCT ³ , Anton Paar) atB thickness gauge	https://www.anton-paar.com/corp-en/products/details/nano-scratch-tester-nst3/
2.76.	scanning electron microscope with EDS	https://www.jeol.co.jp/en/science/sem.html
2.77.	Jupiter XR Atomic Force Microscope	https://afm.oxinst.com/products/jupiter-family-of-afms/jupiter-xr-afm?gclid=CjwKCAjwrqqSBhBbEiwAlQeqGvi2uIKi5ke moYeK-UYKM4-jwnh3oLQnHQw3FB5prZL44GKXO0AiEhoCag8QAvD_BwE
2.78.	Simultaneous Thermogravimetry/ Differential Thermal Analyzers Shimadzu DTG-60/60	https://www.ssi.shimadzu.com/products/thermal-analysis/dtg-60.html
2.79.	Furnace NABERTHERM LHT 04/18	https://nabertherm.com/sites/default/files/2021-01/thermalprocesstechnology_english.pdf
2.80.	Vacuum Furnace VHT 25/24-GR	https://nabertherm.com/
2.81.	Vacuum Equipment and Accessories	https://www.industrialvacuum.com/parts-accessories
2.82.	HOT PRESSING Technology Equipment	https://www.industrialvacuum.com/parts-accessories
2.83.	Ion implantation equipment MateriaNova	https://www.agc-plasma.com/?gclid=CjwKCAjwrqqSBhBbEiwAlQeqGgMt TwADzvcyFQs18_nTfr4qEYcQhsX8mD1m3dcWSc-ifU8K_tHNhoCZEKQAvD_BwE
2.84.	PVD Machines	https://kolzer.com/pvd-machines?www.kolzer.com&gclid=CjwKCAjwrqqSBhBbEiwAlQeqGvwFvo12XyqUnXQobgxMmbZU6j9877HHS azb-efuyxpzI1vKCF1wFBoCNNcQAvD_BwE

2.85. Magnetron sputtering source with 2" target - 3 pcs.

2.86. Targets for magnetron 2" - Ta, Hf, Al, Ti (<https://www.lesker.com/materials-division.cfm?section=sputtering-targets>)

2.87. 2" Magnetron Sputtering Coater w/ Selectable DC or RF Power Source and with Turbo Pump Station (MTI Corp.) (<https://www.mtixtl.com/2RFPlasmaMagnetronSputteringCoater-VTC-STX-XX.aspx>)

2.88. TORUS® Magnetron Sputtering Cathodes 2" (Kurt J. Lesker Company) - 3 pcs. (https://www.lesker.com/newweb/deposition_sources/torus_sputtercathodes_circularmagkeeper.cfm)