1. **Identification of documents\banknotes security elements.**
   Objective: to obtain knowledge about basic means of preventing documents\banknotes from counterfeiting and forgery; to get to know modern document authenticity evaluation techniques generally used in document security technologies; to learn to identify banknotes\documents.

2. **Control of submicron elements by the optical analyser NIKON – S.**
   Objective: to observe linear and stepper dimensions of submicron elements in passing light. Measured values range from 0.5 to 190 μm.

3. **Surface wetting angle measurement.**
   Objective: to determine the wetting angle of a given sample after physical, chemical, mechanical, ion plasma etc. impact; to plot diagrams of surface wettability.

4. **Infrared (IR) spectroscopy.**
   Objective: to obtain knowledge about infrared (IR) spectroscopy method; to learn about spectrophotometer SPECORD 75, used for spectra recording; to identify the polymer mixtures by infrared spectroscopy technique.

5. **Measurement of colours by spectrophotometry method.**
   Objective: to gain knowledge about basic quantities describing photometric properties and colour of materials; to measure reflectance coefficient of given samples for different wavelengths of light by photometer FO – 1; to calculate the main characteristics of sample colour.

6. **The formation of dielectric coating (SiO_2) by electron beam in vacuum.**
   Objective: to gain knowledge about the formation technique of coatings (SiO_2) in vacuum by electron beam; to form SiO_2 dielectric coatings of various thicknesses on Si substrates using an electron gun
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7. **Investigation of ceramics employing X-ray photoelectron and Auger electron spectroscopies**
   Objective: to familiarize with the methods of X-ray photoelectron spectroscopy and Auger electron spectroscopy; to investigate surface of the ceramic sample using „XSAM800 Kratos Analytical" X-ray photoelectron spectrometer.

8. **Laser interference lithography**
   Objective: to familiarize with fabrication technology of periodical structures, namely laser interference lithography; to fabricate periodical structures in photoresist; to estimate the period of fabricated diffraction grating and orientation of gratings in respect to each other; to measure linear dimensions and quality of fabricated structures employing optical microscope.

9. **Investigation of semiconductor laser**
   Objective: to familiarize with optical electronics semiconductor devices, light diode, semiconductor laser, photodiode; to investigate current-voltage and luxampere characteristics of semiconductor laser; to estimate dependence of efficiency on power used by laser; to evaluate forbidden gap width and external quantum efficiency of semiconductor.

10. **Investigation of periodical structures employing optical methods**
    Objective: to familiarize with investigation of periodical structures employing optical methods; to evaluate diffraction efficiency of periodical structures; to estimate their geometrical dimensions employing optical microscope.

11. **Ultraviolet and visible light spectroscopy**
    Objective: to familiarize with method of ultraviolet and visible light spectroscopy; to investigate optical characteristics of thin semiconductor films.

12. **Electrical measurements of resistance of semiconductors and conductors**
    Objective: to familiarize with mechanisms of electrical conductivity of semiconductors and conductors; to perform and analyse temperature influence on resistance of semiconductors and metals; to evaluate forbidden gap width of semiconductor.

13. **Scanning electron microscopy (SEM) and energy dispersive X-ray spectrometry (EDX/EDS)**
    Objective: to familiarize with methods of scanning electron microscopy and energy dispersive X-ray spectrometry; to perform SEM measurements employing different modes and learn to analyse obtained images; to perform EDX measurements and learn to evaluate the composition of investigated sample.

14. **Measurements of ionic conductivity of ceramic materials employing impedance spectroscopy method**
    Objective: to familiarize with mechanisms of ionic conduction in ceramic materials; to perform measurements of ionic conduction dependence on temperature for these materials; to estimate activation energy of ionic conduction.

15. **Quantitative evaluation of the surface free energy of solid state materials**
    Objective: to evaluate the critical surface tension of the surface of solid state body using contact angle goniometer and four different liquids; to evaluate surface free energy using Owens and Wendt graphs.

16. **Formation of thin film structure topology using contact photolithography**
    Objective: to form and characterize a single layer topology on a Si substrate using contact photolithography.

17. **Surface characterization using atomic force microscope**
    Objective: to learn to characterize the surface of a sample using atomic force microscope (AFM); to quantitatively evaluate surface morphology and other properties of the sample.

18. **Investigation of polarising laser attenuator**
    Objective: to familiarize with the tendencies of polarized optics and its capabilities to use polarizing elements for the control of the intensity of a laser beam.

19. **Measurement of the Brewster angle using white polarized light**
    Objective: to measure the Brewster angle of dielectric materials of different refractive indexes using a randomly chosen wavelength within the visible spectrum and a motorized setup for white polarized light measurements.

20. **Micro-machining of materials using femtosecond laser pulses**
    Objective: to determine the threshold of laser effect for materials; to micro-machine surfaces using femtosecond laser “Pharos” and setup for microfabrication “FemtoLAB”.

21. Pump-probe spectroscopy

Objective: to investigate material absorption kinetics using pump-probe spectrometer “Harpia” and femtosecond laser “Pharos”.

22. Formation of ceramic layers using plasma spray method

Objective: to familiarize with the method of the plasma spray in vacuum; to fabricate a ceramic layer.

23. Determination of Laser Beam Quality Factor (M^2)

During the laboratory work, the beam quality of the semiconductor laser is investigated using a camera profiler.

24. Determination of the Light Coherence Length Through the Spectral Analysis

During laboratory work, the spectra of different light sources are studied with a spectrophotometer and the coherence of the light is determined by evaluating their spectral width.

25. Determination of the Material Ablation Threshold with a Femtosecond Laser

During the laboratory work, using the femtosecond micromachining system material surface is ablated by changing the energy density and pulse number. The ablation craters are analyzed with an optical microscope and the material ablation threshold is determined with an optical microscope.

26. Surface Plasmons Polaritons

During laboratory work, the laser light reflected from the gold-coated prism surface is measured and the angle at which surface plasmon polaritons (SPPs) are generated is identified.

27. Determination of the Laser Pulse Length Using Autocorrelation Method

During the laboratory work, the duration of light pulses emitted by the Yb:KGW femtosecond laser is measured using the autocorrelation method.