



Laboratory of Thin Film Preparation and Assessment

Principal goals and activities

- Investigation of principal issues in surface engineering, with special focus on thin films deposited using plasmatic methods. Research and development of new systems of thin-film materials with unique functional properties.
- Assessment of physical, mechanical, and tribology properties of metallic and non-metallic materials and thin films.
- Modification of polymer materials using plasmatic methods in order to activate their surfaces.

General focus of laboratory

The laboratory specializes in investigation of research projects focused on modification of material surfaces using thin films deposited using plasmatic methods. The primary goal of thin-film deposition (monolayers, gradient systems, multilayers) is the improvement of utility properties of the modified substrates, e.g. improvement of hardness, resistance to corrosion and wear, reduction of friction coefficient, provision of biocompatibility, etc. The laboratory also looks into assessment of physical, mechanical, and tribology properties of metallic and non-metallic materials and deposited layers. The laboratory also investigates modification of polymer materials using plasmatic methods. In this case, they are principally hydrofobization/hydrofilization and deposition of active nanoparticles on the surface of modified polymers.

Specific instruments and outcomes

- RF system for PACVD – plasma-assisted chemical vapour deposition.
- RF system for PACVD/MS – combination of the magnetron sputtering and chemical deposition from the gas phase assisted by plasma.
- Bruker DektakXT surface profiler – measurement of surface roughness, step height, stress in thin films.
- Bruker CETR-Apex scratch tester – measurement of thin-film adhesion to the substrate using a nick test.
- Bruker CETR-Apex high-temperature tribometer – determination of tribology properties of materials in normal and high temperatures (up to 1000°C).
- Anton Paar CSM micro/nano hardness meter – determination of mechanical properties in materials on the micro- and nano-scale (hardness, Young's elasticity modulus, Welast, Wplast, Wtotal, etc.).
- Kalotes – determination of thickness in thin films and coats, utility range from 1 to 50 µm.
- See System by Advex Instruments – determination of wetting power by measurement of the angle of contact and calculation of surface free energy.

