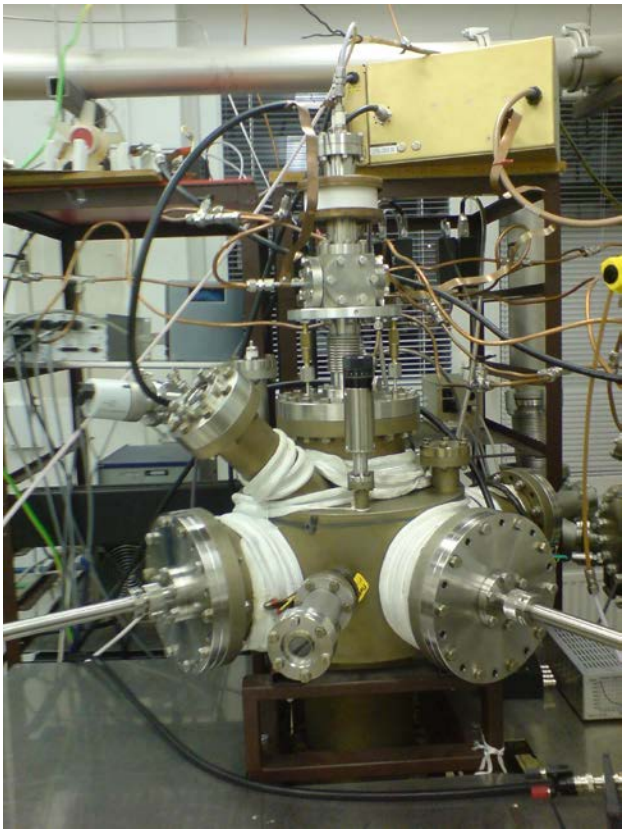
Plasma deposition systems

The hybrid HIPP (Highly Ionized Pulse Plasma) deposition system based on a combination of modified pulse-dc magnetrons with a high degree of ionization and the hollow cathode plasma jets with flowing working gas has been constructed. The hybrid deposition system operates in a dual HIPIMS (High Power Impulse Magnetron Sputtering) + MF (mid -frequency) pulse-dc mode of deposition plasma excitation as well. MF pulse-dc addition to the HIPIMS pulses significantly improves the quality and adhesion parameters of the deposited optical structures. Further laboratory implemented original plasma apparatus allows the preparation of nanostructured functional systems arising from the deposition of nanoclusters with controlled size distribution. The plasma characterization of deposition system is based on a specially modified mass spectrometry of formed clusters. Plasma deposition apparatus is equipped with a substrate holder with the possibility of connecting the bipolar MF pulse-dc bias. This configuration is intended particularly for the preparation of dielectric optical thin films. The deposition system is very suitable for the preparation of thin films on a polymer substrates (e.g. deposition of the PZT layers on kapton foil with Cu electrode) and the deposition of functional structures on substrates with conductive electrode (metal, ITO, etc.) The hybrid HIPP deposition system is equipped with instruments for characterization of plasma deposition parameters using a range of time-resolved diagnostic techniques. It includes a time-resolved Langmuir probe, retarding field energy analyzer (RFEA) for ion velocity distribution function measurement (IVDF) and time-resolved emission spectroscopy.

Realized hybrid plasma system is designed primarily for the preparation of functional structures of doped oxides of TiO_2, WO_3, Fe_2O_3, Y_2O_3, Sc_2O_3, $(Ba_xSr_{1-x})TiO_3$, ZrO_2, HfO_2, Bi_2O_3, NiO, ZnO, etc., including deposition of selected structures of nanoclusters with controlled size distribution.



Hybrid plasma deposition system

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