VUV MAGNETO-OPTICAL TRANSIENT ELLIPSOMETER: ELIps

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The ELIps instrument being built at the European Extreme Light Infrastructure Beamlines (ELI Beamlines) will combine three advanced techniques of ellipsometry: VUV ellipsometry, transient (Pump-probe) ellipsometry, and magneto-optical ellipsometry [1] The working range of energies in the VUV is between 12 eV and 40 eV, this VUV radiation will be provided by a High Harmonics Generation (HHG) source driven by a high-power femtosecond-laser.

The instrument complements already established VUV ellipsometers at synchrotron light sources [2] by using pulsed laser light sources that can be synchronized allowing the measurement of processes with a time-resolution of a few picoseconds. The pump pulse from a laser hits the sample first, triggering e.g. charge transfer processes; these processes can be observed and quantified by measuring the changes on the optical properties of the material by a probe pulse. The pump beam is a single wavelength beam that can be chosen from 180 nm – 20 um. A Helmholtz coil is also installed in the instrument, which can deliver a field of up to 1.5 T at a rate of up to1 kHz. It would be possible to obtain the transverse magneto-optical Kerr Effect and probe e.g. the excitation of spin-polarized states.

All the components are contained within a single UHV chamber (with a target pressure lower than 10^{-8} mbar) designed with several additional ports to support future upgrades such as a sample preparation chamber. Furthermore, a cryostat allows temperature dependent studies.

Additional to the VUV ellipsometer, at ELI Beamlines, there is table top system for time-resolved ellipsometry utilizing super-continuum white-light pulses ranging from 350 nm – 750 nm that might be combined with the ELIps instrument.

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Keywords: VUV ellipsometry, Pump-probe, Transient, Ultrafast phenomena, UHV

References

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