**Electron-Paramagnetic-Resonance** **Spectrometer**

**Equipment:** EPR (Electron-Paramagnetic-Resonance)

**No. of Equipment: UPO13**

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**Equipment Description**

**Description of equipment:**

Electron Paramagnetic Resonance (EPR) spectroscopy is similar to any other technique that depends on the absorption of electromagnetic radiation. EPR presents a remarkably useful form of spectroscopy used to study molecules or atoms with an unpaired electron. A molecules or atoms have discrete (or separate) states, each with a corresponding energy. Spectroscopy is the measurement and interpretation of the energy differences between the atomic or molecular states. Depends on the studied materials you can obtain useful information about anisotropy or spin states. In organic radicals representing the interacting systems, EPR helps with recognizing paramagnetic substances, geometric and electronic structure of paramagnet or with information about distances of radicals. In transition metals using the EPR gives qualitative information about type and number of ligands.

EPR is a non-invasive technique (similar to NMR), which can be applied either to living systems to monitor a distribution of O2 or NO in tissues or used analytically to observe labeled species in situ in biological or in chemical reactions.

**Specification of expertise relevant to NanoEnviCz workpackages:**

**WP3**a,c-h, **WP4**a-c, **WP5**c, **WP6**a,b,f, **WP7**a-i, **WP8**a-f,

**Detailed description of expertise**

**Please, specify the main research topics connected with equipment**:

Magnetism, magnetic properties

**Please, specify the secondary research topics connected with equipment**:

Structural properties, chemistry of bonds

**Keywords describing research area:** magnetism, structure, inorganic and organic compounds

**Competence**

**Relevance for applied and industrial research:**

With knowledge of the energy differences between the atomic or molecular states, using the EPR can gain insight into the identity, structure, and dynamics of the sample under study.

**Relevance for fundamental studies:**

EPR spectroscopy can be applied to any sample that contains a paramagnetic electron. This includes a wide range of samples from the whole scale of basic organic and inorganic compounds. The measured spectra are used to identify molecules within a sample and more importantly, to characterize the environment of the unpaired electron. One of the biggest advantages of EPR is its high sensitivity (1000x more sensitive than NMR) and good specificity (it scan only region containing the unpaired electron).