**Equipment (The SpectraMax iD3)**

completed by responsible coordinator of equipment

**Equipment:** The SpectraMax iD3 Multi-Mode Microplate Reader

**No. of Equipment:** IEM1

**Responsible coordinator:** Ing. Mgr. Táňa Závodná, Ph.D.

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**Equipment Description**

The SpectraMax iD3 Multi-Mode Microplate Reader is a versatile highly accurate and sensitive laboratory instrument designed for various bioanalytical applications. It integrates multiple detection modes including absorbance, fluorescence, and luminescence, making it suitable for a wide variety of assays such as ELISA, nucleic acid quantitation, enzyme kinetics, and cell viability studies. The versatility of the SpectraMax reader is enhanced by its compatibility with a wide range of microplate types and sizes (supporting also high throughput experimental design) and the possibility to customize settings and protocols to meet specific assay requirements. The instrument allows for temperature control and shaking options, which are essential for kinetic assays and long-term incubations. SpectraMax iD3 poses a user-friendly interface, which includes a touchscreen control and integrated SoftMax Pro software for advanced data analysis.

Selected specifications:

Item Description

Plate formats 6, 12, 24, 48, 96, 384-well plates ANSI/SLAS conformant

Maximum height 22 mm

Reading capability Plates and cuvettes (with adapter)

Robotic compatible Yes

Shake Orbital, double orbital, linear

Temperature control 5°C (7.2° F) above ambient up to 66°C (150.8° F). At temperature range from 55°C (131°F) up to 66°C (150.8°F) ambient temperature of 25°C (77°F) is required.

Absorbance wavelength range 230 - 1000 nm

Fluorescence wavelength range EX 250-830 nm

EM 270-850 nm

Luminescence wavelength range 300-850 nm

Wavelength selection 1.0 nm Increments

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

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| **WP3 SYNTHESIS AND DESIGN OF NEW MULTIFUNCTIONAL NANOMATERIALS FOR ENVIRONMENT PROTECTION** | |
| Conceptually new nanostructured materials with the potential for application in innovative technologies | X |
| Computer aided nanomaterials design |  |
| Low dimensional materials and their composites (carbon dots, nanotubes, graphene derivatives) |  |
| Nanofibers |  |
| Magnetic hybrids |  |
| Metal and metal oxide NPs |  |
| Redox active nanomaterials | X |
| Nanomaterials for biomedical applications | X |
|  | |
| **WP4 HETEROGENEOUS CATALYSIS FOR ENVIRONMENTAL PROTECTION** | |
| Nanomaterials for catalytic degradation of pollutants in water, soil and air | X |
| Nanostructured heterogeneous catalysts for abatement of pollutants from industrial processes and automotive transport |  |
| New “clean” catalytic processes for chemical production |  |
|  | |
| **WP5 NOVEL NANOMATERIALS AND TECHNOLOGIES FOR SUSTAINABLE PRODUCTION** | |
| Processes and technology for sustainable energy and chemical production |  |
| Catalytic processes for transformation of natural gas to liquids |  |
| Nanomaterials for utilization of renewables; Magnetically separable green catalysts |  |
|  | |
| **WP6 EFFECTIVE PHOTOCATALYTIC TECHNOLOGIES** | |
| Mastering nanomaterials for photocatalysis |  |
| Effective photocatalytic processes |  |
| Photovoltaic paints |  |
| Functional surfaces for environmental protection |  |
| Hybrid materials combining photocatalysts and heterogeneous catalysts |  |
| Thin photocatalytic films for direct solar splitting of water |  |
|  | |
| **WP7 NANOTECHNOLOGY FOR TRAPPING AND CHEMICAL DEGRADATION OF POLLUTANTS** | |
| Nanomaterials for sorption |  |
| Natural based nanomaterials produced by “green” technology |  |
| Reactive sorbents for degradation of pesticides and highly toxic agents | X |
| Degradation of chemical warfare agents |  |
| Analysis of filtering capabilities of nanomaterials | X |
| Elimination of radionuclides contamination |  |
| Modified nanofiber filters; Advanced antimicrobial filters/membranes | X |
| Nanoiron for groundwater and waste water treatment | X |
| Nano-trapping of heavy metals | X |
|  | |
| **WP8 SENSING AND MONITORING OF POLLUTANTS** | |
| Efficient sensing of pollutants |  |
| Biosensing by new devises | X |
| Application of new sensors in monitoring of pollutants |  |
| Magnetic sensors; Magnetically assisted SERS sensors |  |
| Advanced electrochemical sensors |  |
| Graphene based nanosensors | X |
|  | |
| **WP9 TOXICITY AND RISKS OF NANOMATERIALS** | |
| Health risks | X |
| Environmental risks | X |
| „In vitro“ and „in vivo“ toxicity tests – cytotoxicity, genotoxicity, interactions with membrane | X |
| RNA gene expression changes and protein expression changes |  |
| Complete eco/aquatoxicity ecotoxicity evaluation | X |
| Toxicity against bacteria and fungi | X |

**Detailed description of expertise**

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

The main area of the application lies in studying interactions of nanomaterials with biological systems. The reader is among the key instruments for nanotoxicological studies and safety assessment of nanomaterials. Due to its multimode character, a wide range of biological assays can be evaluated using SpectraMax iD3 Multi-Mode Microplate Reader. Examples of the applications are absorbance-based nucleid acid or protein concentrations measurements, microbial growth, fluorescence intensity measurements or bioluminescence-based assays. In general, the microplate reader is applicable for cell biology, molecular biology, microbiology, immunology, biochemistry, genomics, etc.

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

The reader can be used in the development of nanomaterials for environmental applications, I particular in studying their efficiency and biocompatibility.

**Keywords describing research area:**

Life sciences, nanotoxicology, nanosafety assessment, biocompatibility, nano-bio interactions, pharmacology

**Competence**

**Relevance for applied and industrial research:**

Due to its multi-mode detection capabilities, the SpectraMax iD3 is a key tool in life sciences research, pharmaceutical development, biochemistry, as well as clinical diagnostics. The main application area is the *in vitro* assessment of nanotoxicity and nanosafety and high-throughput screening of biological effects of nanomaterials.

**Relevance for fundamental studies:**

SpectraMax iD3 reader is a versatile instrument enabling to study interactions of nanomaterials with biological systems, mechanisms of biological activity of nanomaterials, and allows for studying various toxicological endpoints and cell behavior as a consequence of cell contact with nanomaterials.

**Comments**