**Equipment (název přístroje v AN)**

completed by responsible coordinator of equipment

**Equipment:** LEICA CLSM SP8/DLS

**No. of Equipment:** *UJEP*

**Responsible coordinator:** Mgr. Jan Malý, Ph.D.

**Name of Institution:** Department of Biology, Faculty of Science, Jan Evangelista Purkyne University

**Address of Institution:** CPTO, Pasteurova 3632/15, 400 96 Usti nad Labem

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**Telephone:** 475286784

**Equipment Description**

Fully motorized confocal laser scanning microscope SP8 from Leica enclosed in an environmental chamber allowing temperature, humidity and CO2 levels control around the sample. Equipped with a digital light sheet (DLS) module.

Laser lines: 405 nm, argon laser (458, 488, 514 nm), 561 nm, 633 nm.

Leica objectives: L 1.6x/0.05 DLS, HC PL FLUOTAR 2.5x/0.07, HC PL FLUOTAR 5x/0.15, HC PL FLUOTAR 10x/0.30, HC PL APO 20x/0.75 CS2, HC PL APO 63x/1.40 OIL CS2.

Water immersion DLS detection objectives: HC PL FLUOTAR 5x/0.15 IMM DLS, HC APO L 10x/0.30 W DLS, HC FLUOTAR L25x/0.95 W DLS

Detectors SP8: 2x PMT, 1x HyD SP GaAsP

DLS: Hamamatsu Flash 4.0 V3

Inserts for imaging in a classical microslide format, 3 cm/6 cm dishes, multi-well plates. All inserts allow introduction of microtubing (microfluidics experiments).

**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 |  |
| 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 |  |
| Nanomaterials for biomedical applications | x |
|  |
| **WP4 HETEROGENEOUS CATALYSIS FOR ENVIRONMENTAL PROTECTION** |
| Nanomaterials for catalytic degradation of pollutants in water, soil and air |  |
| 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 |  |
| Degradation of chemical warfare agents |  |
| Analysis of filtering capabilities of nanomaterials |  |
| Elimination of radionuclides contamination |  |
| Modified nanofiber filters; Advanced antimicrobial filters/membranes |  |
| Nanoiron for groundwater and waste water treatment |  |
| Nano-trapping of heavy metals |  |
|  |
| **WP8 SENSING AND MONITORING OF POLLUTANTS** |
| Efficient sensing of pollutants |  |
| Biosensing by new devises |  |
| Application of new sensors in monitoring of pollutants |  |
| Magnetic sensors; Magnetically assisted SERS sensors  |  |
| Advanced electrochemical sensors |  |
| Graphene based nanosensors |  |
|  |
| **WP9 TOXICITY AND RISKS OF NANOMATERIALS** |
| Health risks  |  |
| Environmental risks |  |
| „In vitro“ and „in vivo“ toxicity tests – cytotoxicity, genotoxicity, interactions with membrane | x |
| RNA gene expression changes and protein expression changes | x |
| 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**:

Development of novel microfluidics platforms for controlled generation of multicellular tumour spheroids (MCTS).

Efficacy testing of various drugs designed to suppress MCTS growth.

Invention of microfluidics platforms allowing MCTS generation, treatment and imaging on a single chip.

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

Live imaging experiments (Time-lapse experiments following drugs penetration into cells, effects on cell proliferation and death).

Establishment and adjustment of optical clearing methods for 3D imaging of MCTS, zebrafish embryos and tardigrades eggs and whole-mounts.

**Keywords describing research area:**

Microfluidics, Tumour spheroids, Live imaging

**Competence**

**Relevance for applied and industrial research:**

Novel designs of microfluidic devices.

**Relevance for fundamental studies:**

Indispensable for high-resolution 3D-4D imaging of cells, MCTS and whole-mounts of studied organisms.

**Comments**