



PEPRIC Particle Spectrometer

PPS4S-AS

PPS4S-AS – ex-vivo Pepric Particle Spectrometer

The ex-vivo PPS **quantifies magnetic particles:**

SPIO, USPIO, MNP, target specific iron oxide particles and magnetic contrast agents, magnetic drug carriers, particles for hyperthermia and thermo-ablation; and pre-labeled cells, therapeutic cells, stem cells.

Complementing pre-clinical MRI with supporting quantitative data for **molecular imaging** and **molecular diagnostics:**

Combined analysis with PPS and MRI offers the solution for accurate and quantitative determination of the distribution of particles and labeled cells. The PPS enables to study the pharmacokinetics of cell and particle therapies and diagnostics.

Blood clearance time, cell and particle migration, saturation and clearance of target tissue, saturation dose, optimal dose repetition time, efficacy of particle coating for targeting, ...

Instant quantitative results in minutes time, no post-processing of spectra is required.

Direct quantification:

No disturbance from iron molecules naturally present in blood or liver;

All **organ tissues** and raw **blood** samples can be analysed, also lung samples complementing MRI images.

Avoid sampling errors and win time since **no sample preparation or manipulation** of blood or tissue is required.

Key Features include:

- Instant quantitative results
- Direct and selective measurement
- No sample preparation required, eliminating manipulation errors
- Non-destructive, tissues are conserved for further biochemical analysis
- Non-invasive for labeled cells, cells remain viable and keep their functionality
- MRI compatible Data.
- Easy to Use, minimal Hands-on
- Automated 720 PCR tube measurements per 24 hours

Ex-vivo analysis with PPS

Ex-vivo PPS (Pepric Particle Spectrometer) is for the analysis of magnetic iron oxide nanoparticles in blood and tissues, ex-vivo or in-vitro. The PPS measures the total amount of magnetic labels contained in the organ or blood sample, allowing to reconstruct the overall distribution of the nano labels administered to the animal.

Applications of Pepric tools are found in bioprocesses requiring longitudinal monitoring such as the study of the pharmaco-kinetics of cell and particle therapies: the blood clearance time, the migration of cells and particles, the saturating dose and clearance time in tissues. Based on the quantitative results, the maximal effective dose and dose repetition time of cells or particle therapies can be measured and optimized.

The Pepric Particle Spectrometer 'PPS' is based on a direct and selective detection method pEPR 'particle Electron Paramagnetic Resonance'. PPS4S-AS uses an RF frequency of 150 MHz and alternating 5 mT peak-to-zero magnetic field to measure pEPR signal from samples. When the quantitative pEPR method is combined with MRI for accurate location of the magnetic nanolabels, it offers the solution for quantitative distribution studies.

The PPS is used for blood analysis or tissue analysis without sample preparation. Whole blood or unprepared tissue samples are put directly in sample tubes. Today PCR tubes with a sample content of about 150 μ L are inserted into a sample holder. This sample holder is moved into the measurement module. The amount of particles contained into the sample is displayed within a few seconds on the read out and controlling computer.



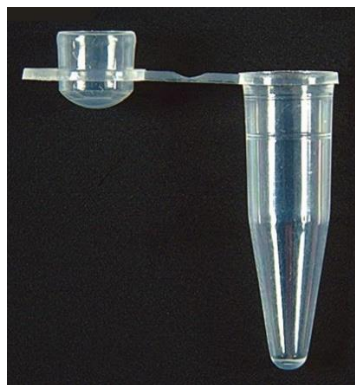
PPS4S-AS: Operation



Figure 1. Appearance of PPS4S-AS

The total analysis system is computer controlled and easily operated, and measurement results are saved into a data file.

Biological samples are contained preferably into 200 μ L PCR tubes since the automated sample holder is made compatible with these PCR tubes. The automated sample holder can slide into the coil box, positioning the sample accurately in the center of the transceiver coils. (Refer to sample and protocols document for more information)



Total 132 samples can be placed on sample containers of PPS4S-AS so that automated measurements can be performed unattended during a whole day of 24 hours. An robot arm inside the PPS4S-AS picks up a sample from a sample container, place it into a measurement chamber, wait while the sample is measured, and place it back on the sample container. The order of sample measurements can be designated on software through a graphical user interface. The throughput of measurements is 720 PCR tubes per 24 hours. Typically, a measurement of a sample of interest in a PCR tube is followed by a measurement of a sample of background in another PCR tube to cancel out the background noise, forming one sample measurement. The throughput of 720 PCR tubes per 24 hours corresponds to 360 sample measurements per 24 hour, and three repetitions of 120 sample measurements per 24 hour. Typically a sample measurement is repeated at least three times to figure out their statistical data.

PPS4S-AS: Optimal installation

Best results with the PPS4 are obtained in an air-conditioned room with temperatures not exceeding 21°C.

The detection and quantification instrument can be plugged in to the standard primary AC power supply circuit (220-230V), and requires no additional gas or liquids supply neither for operation nor cooling.

Additional features or product optimizations for the PPS4-AS can be implemented upon request.

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