

## SCCH

### Software Competence Center Hagenberg

Programme: COMET – Competence Centers for Excellent Technologies

Programme line: K1-Centres

COMET subproject, duration and type of project:

iKM, 01/2015 – 12/2018, multi-firm/ single-firm

## No Nanoparticle shall evade us!

In the realm of the project “Nanoparticle Tracking”, funded by the Austrian Research Promotion Agency, researchers at Software Competence Center Hagenberg (SCCH) have succeeded in significantly improving the analysis of nanoparticle samples.



### Characterization of nanoparticle samples

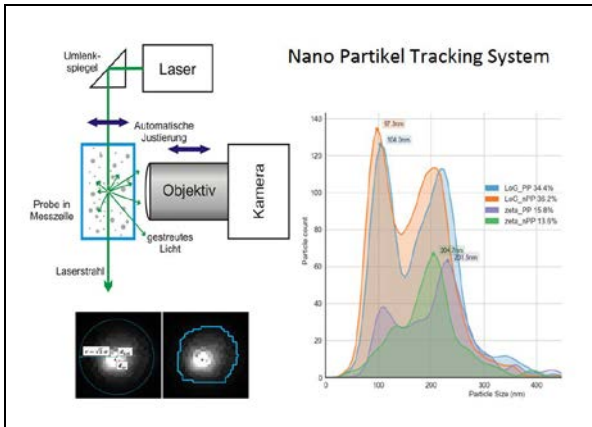
Characterization of nanoparticle samples has a high profile in research and development as well as in industrial processes, and it satisfies an important prerequisite for understanding processes and covers important aspects of quality assurance in biology, medicine, chemistry and physics. In the development of new therapy options for treating autoimmune disorders and cancer, exosomes (30 to 90 nm intracellular components of a cell) are popular and promising. Analysis of exosome samples usually occurs via nanoparticle tracking processes that employ Brownian Diffusion to determine the size of the particles. Nanoparticle measurement leads to size distribution of particles in a sample. However, if a sample contains particles of different sizes, then there can be overlaps in the size distribution; this pronouncedly encumbers the determination of individual particle sizes. This can result in faulty measurements, additional material consumption and increased waste.



### More efficient and more precise sample analyses

Particle Metrix in Germany produces nanoparticle analysis instruments; the methods they apply are nanoparticle tracking and 180 grad dynamic light scattering. “We seek to optimize our analysis methods. Therefore we consulted the experts at SCCH,” notes Dr. Hanno Wachernig of Particle Metrix. Dr. Thomas Hoch und Matthias Dorfer, MSc. at SCCH succeeded in developing a new process that separates a particle population based on additional characterization of the particles using their visual appearance. For the first time, this has enabled separating particles of the same size but different scatter patterns into separate groups.” The difficulty is to process the video images so that the extracted image characteristics can be used for grouping the particles, because the imagery of a particle is in no relation to its actual size,” reports Hoch. SCCH researchers developed a software solution that couples Particle Metrix’s existing nanoparticle tracking analyzer with dynamic image evaluation. Thus the particles of

a sample are now grouped via statistical methods according to their optical properties.



**Fig. 1:** The picture on the left shows the measurement setup and right the measured distribution of a bimodal sample (100/200nm particle). Four different methods were used, only the process based on LOG were able to release both distributions. (Image source SCCH)

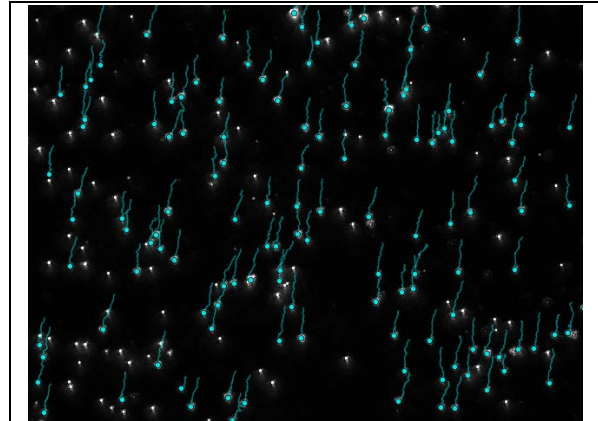


### Impact and effects

In medical domains, especially in cancer research, nanoparticle tracking analyzers can help to analyze extracellular vesicles (EVs) where other techniques characterize inadequately or not at all. In material sciences, new materials can be characterized whose dimensions are in the sub-micrometer range, e.g., carbon nano-

tubes or pigments, and fill materials such as titanium dioxide and silicon dioxide.

SCCH's new analysis method was successfully introduced at the International Society for Extracellular Vesicles (ISEV) in Washington, USA, and it is already in test use by selected customers of Particle Metrix. Chances are good that this new method for nanoparticle tracking will find application. "We have done our part. However, we naturally have ideas for additional research in this area," Dr. Thomas Hoch adds.



**Fig. 2:** Nanoparticle tracking using the dynamic light scattering method (Image source Particle Metrix/SCCH)

### Contact and information

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**Further information on COMET – Competence Centers for Excellent Technologies:** [www.ffg.at/comet](http://www.ffg.at/comet)

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