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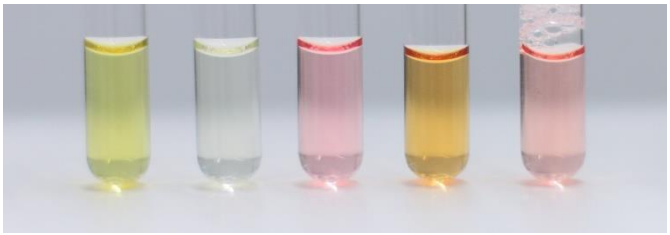
Licensing Opportunity

Perfecting accuracy and precision of dynamic and static light scattering with artificial intelligence



Summary

Dynamic and static light scattering (DLS, SLS) are fundamental nanoscale analytical techniques to characterize particle systems, but their power is limited by the presence of sample artefacts.

This problem is critical and often makes impossible to properly characterize *e.g.* the morphology resulting from nanoscale self-assembly and the behavior of nanoparticles in complex matrices, such as blood.

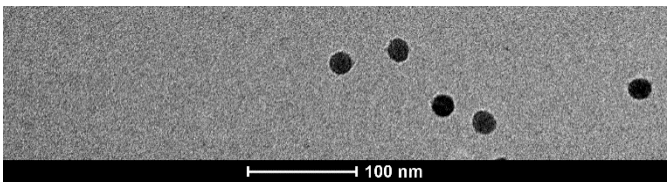
To overcome this challenge, an absolute and bias-free approach—based on artificial intelligence—was developed (AI-DLS, AI-SLS). It enables the most accurate and most precise light scattering characterization so far.

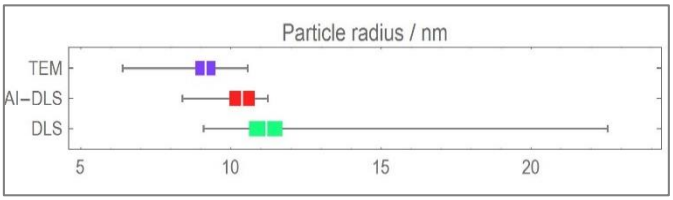
Background

Accuracy and precision are the most relevant analytical parameters in the approach of *analytical quality by design (AQbD)* where the *analytical target profile (ATP)* defines the objectives and criteria of the reportable result. These are necessary to adequately characterize the *critical quality attributes (CQA)* of any given process. Unfortunately, until now light scattering could not always guarantee high quality, in terms of accuracy and precision.

Invention

This development enables the most accurate and most precise light scattering characterization available today. It relies on AI techniques—including classification, pattern and anomaly detection, and feature restoration—with a powerful knowledge base describing fundamental aspects of thermodynamics, statistical physics, quantum mechanics, statistical optics. Example: Size measurement of superparamagnetic iron-oxide nanoparticles. Electron microcopy (TEM) shows excellent agreement with light scattering only when artificial intelligence is involved (AI-DLS). Without AI (DLS), the quality of light scattering results is however poor, owing to sample artefacts.





Fields of Application

Experimental techniques relying on light scattering, such as DLS, SLS, MALS/GPC/SEC): Nanoparticles, Bionanotechnology, Nanotoxicology, Nanomedicine and, Pharmaceuticals, Food science, Cosmetics

Patent pending

Publication

a) O. Rifaie-Graham, X. Hua, N. Bruns and S. Balog, Small, 2018, 14, e1802295, b) D. Bossert, F. Crippa, A. Petri-Fink and S. Balog, Anal Chem, 2018, 90, 3656-3660, c) D. Bossert, J. Natterodt, D. A. Urban, C. Weder, A. Petri-Fink and S. Balog, J Phys Chem B, 2017, 121, 7999-8007..

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